SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

[*The* MINING JOURNAL *is Registered at the General Post Office as a Newspaper, and for Transmission Abroad.*]

No. 2574.—VOL. LIV. LONDON, SATURDAY, DECEMBER 20, 1884. PRICE (WITH THE JOURNAL) SIXPENCE BY POST £1 4s. PER ANNUM.

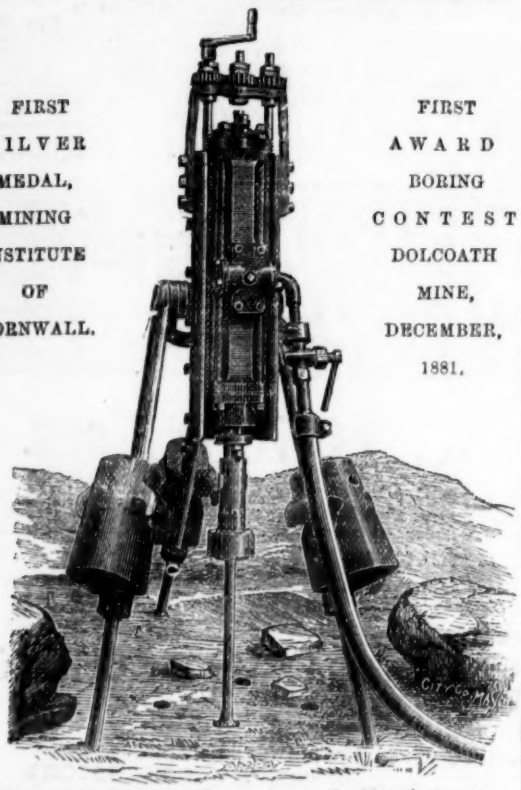
FIRST SILVER MEDAL, ROYAL CORNWALL POLYTECHNIC —Highest Award for Effectiveness in Boring, and Economy in the Consumption of Air.

JUBILEE EXHIBITION, 1882.

THE PATENT

"CORNISH" ROCK DRILL.

FIRST SILVER MEDAL, MINING INSTITUTE OF CORNWALL.



FIRST AWARD BORING CONTEST DOLCOATH MINE, DECEMBER, 1881.

Prices and particulars on application to the Manufacturers,

HOLMAN BROTHERS,

CAMBORNE FOUNDRY AND ENGINE WORKS, CAMBORNE, CORNWALL.

ENGINES, AIR COMPRESSORS, TUNNELLING CARRIAGES, TRIPODS, &c., From own design, or to order.

THE PATENT

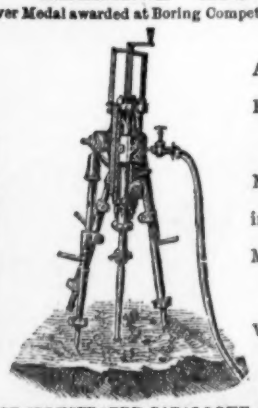
"ECLIPSE" ROCK-DRILL

AND

"RELIANCE AIR-COMPRESSOR."

First Silver Medal awarded at Boring Competition, East Pool Mine, Sept. 1883.

SILVER MEDAL—PARIS, 1878—HIGHEST AWARD



Are NOW SUPPLIED to the ENGLISH, FOREIGN, and COLONIAL GOVERNMENTS, and are also IN USE in a number of the largest MINES, RAILWAYS, QUARRIES, and HARBOUR WORKS in GREAT BRITAIN and ABROAD.

FOR ILLUSTRATED CATALOGUE AND PRICES, apply to—

HATHORN & CO., 22, Charing Cross, London, S.W.

MORDEY, CARNEY, AND CO. (LIMITED),

SHIPBUILDERS, AND MARINE AND GENERAL ENGINEERING WORKS,

DRY DOCKS, NEWPORT, MON.

All kinds of WROUGHT and CAST IRON STRUCTURAL WORK, including Girders, Tanks, Boilers, Colliery Plant, Winding Engines, Iron Coal Wagons, heavy Smith Forgings, Dock Gates and Caisons, and requirements of Harbour and Dock Works, &c., &c.

All Orders executed promptly, and Tenders from Plans and Specifications.

RAILS—STEEL AND IRON.—

NEW, PERFECT, and SLIGHTLY DEFECTIVE. Suitable for Colliery Sidings and Contractors' purposes. Large and assorted Stocks.—Apply for Sheet of Sections to

BOLLING AND LOWE,

2, LAURENCE POUNTNEY HILL, LONDON, E.C.

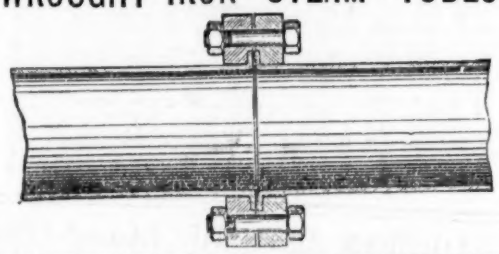
IMPROVED **INGERSOLL** PATENT

ROCK DRILL

MEDALS AND HIGHEST AWARDS.

American Institute, 1872.
American Institute, 1873.
London International Exhibition, 1874.
Manchester Scientific Society, 1875.
Leeds Exhibition, 1875.
Royal Cornwall Polytechnic, 1875.
Rio de Janeiro Exhibition, 1875.
Australia Brisbane Exhibition, 1876.
Philadelphia Exhibition, 1876.
Royal Cornwall Polytechnic, 1877.
Mining Institute of Cornwall, 1877.
Paris Exhibition, 1878.

WROUGHT-IRON STEAM TUBES.



TUBES FOR BOILERS, PERKINS'S, and other HOT-WATER SYSTEMS.

For Catalogues of Rock Drills, Air Compressors, Steel or Iron Steam Tubing Boiler Tubes, Perkins's Tubes, Pneumatic Tubes, and all kinds of Machinery and MINING PLANT, apply to—

LE GROS, MAYNE, LEAVER & CO.

60, Queen Victoria Street, London, E.C.

The New System for Working Gold, Stream Tin, and Diamond Alluvials.

THE "BALL PATENT."

9, BUSH LANE, CANNON STREET, LONDON, E.C.

THE BALL GOLD SYNDICATE—No. 3.

A small Syndicate is being formed to work a Ball Gold Dredging and Saving Plant on an extraordinary property on the following terms:—The Syndicators find the machinery and the capital to work it—about £2000 at most. They receive back out of gold raised—1. All their expenses.—2. One-sixth of the gold remaining after this deduction.

The concession is rich, inexhaustible, runs for about 50 years, and covers an enormous mileage of a river, in a most healthy climate, within one month from London, with good roads, cheap living, civilised country, and in fact every circumstance conducive to a great success.

CAPITAL HALF SUBSCRIBED.

MACHINERY IN HAND TO LEAVE WITH STAFF IN JANUARY.

FEW SHARES LEFT.

See *Mining Journal*, Nov. 15, 1884, "On Prosperous Gold Mining Enterprise," and Nov. 29, 1884, "Ball Gold Syndicate—No. 3," page 397.

AIR COMPRESSORS,

With R. SCHRAM'S Patent **Inlet and Outlet Valves.**

BOILERS, TURBINES.

SCHRAM'S IMPROVED

ROCK DRILL.

1600 in Use in all Parts of the World.

Complete Rock Boring Plants of the most approved construction for Railway Tunnels, Quarries, Shaft Sinking, Level Driving, Stoping, and Submarine Blasting.

All Kinds of Mining Machinery.

ESTIMATES AND FULL PARTICULARS ON APPLICATION.

RICHARD SCHRAM & CO.,

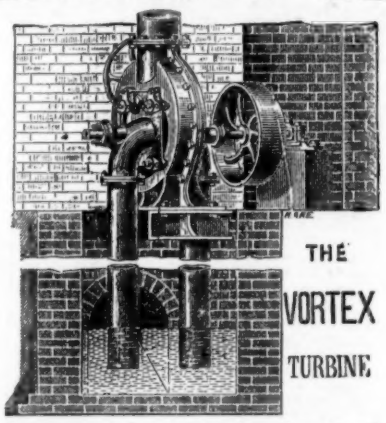
9, NORTHUMBERLAND STREET, CHARING CROSS, LONDON.

GILBERT GILKES & CO.,

KENDAL, ENGLAND,

LATE

WILLIAMSON BROS.



THE **VORTEX** TURBINE

A most efficient means of applying Water Power to all kinds of Machinery.

Largely used in DRIVING AIR COMPRESSORS, PUMPING, WORKING ORE-CRUSHING MACHINERY, and for other purposes in connection with MINING.

Successfully used in ELECTRIC LIGHTING, and in utilising DISTANT WATER POWER by means of ELECTRICITY.

A Pamphlet containing a full description of the Vortex, with several Illustrations and a number of Testimonials, can be obtained on application.

New Patent Simplex Hammer Motion Stone and Ore Breaker.

S. MASON and Co.,

STONE MACHINE WORKS, LEICESTER,

Has been awarded the last MEDAL for their SIMPLEX STONE BREAKER. It only has five wearing parts; others have 26.

LARGE SIZES.

Can be worked by hand.

Catalogue free on application

N.B.—A Machine can be seen working at the Metropolitan Board of Works.

BELL'S ASBESTOS.

BELL'S PATENT ASBESTOS BLOCK PACKING for High-Pressure Engines

The following testimonials refer to this Packing:—

Mona Lodge, Amlwich, Anglesey,
2nd August, 1884.

Dear Sir,—I have much pleasure in answering your note. Bad times in mining have compelled me to try all kinds of expedients in order to effect saving; some have succeeded and some have failed, but my underground manager, Capt. Hughes, has just said to me by the telephone—"The Asbestos Packing is the best thing ever brought here."

It saves money and trouble, but like my gas purifying oxide it lasts so long that you must not expect another order from me for twelve months at least.

Yours truly, T. P. EVANS,
Late H.M. Inspector of Metalliferous Mines.

Mr. J. Bell.

Manchester, Sheffield, and Lincolnshire Railway—Steamship Department,
Grimsby, April 10th, 1884.

Dear Sir,—I have much pleasure in stating that after a trial of over nine months, and comparing it with other packings, I can confidently recommend your Asbestos Packing. It is especially valuable when high-pressures are employed, as in cases where other packings have perished, owing to high temperatures, your packing has invariably stood well. I have also used it with complete success when a gland has heated with other packings, and also in cases of badly scored piston rods. I consider the results I have obtained by its use for our marine engines to have been in every way highly satisfactory. Yours truly,

G. H. CLARKE, Sup. Engineer.

Mr. J. Bell.

Department of the Director of Navy Contracts,
Admiralty, Whitehall, 20th June, 1884.

Sir,—I have to inform you that your tender has been accepted for Bell's Rolled Cloth Asbestos Packing to sample submitted:—Elastic core ... ... Square.
" " ... ... Round.

To Mr. John Bell. JOHN COLLETT, Director of Navy Contracts.

The Patent Block Packing is square, as Fig. 1 and Figs. 2 and 3 represent the Round Block Packing with solid and hollow rubber core, and Fig. 4 without core, but with rubber inlaid. As these packings are extensively imitated, and as it is a common practice among dealers and agents to supply the cheaper manufactures at my list prices, users are requested to see that the packing supplied to them bears the trade mark.

BELL'S ASBESTOS BOILER PRESERVATIVE.—This useful mixture by absorbing the free oxygen that is in the water entirely checks pitting and corrosion. It also disintegrates incrustation so immediately as to prevent its adhering to the plates. Not only is a great economy of fuel effected by keeping boilers clean, but the risk of having the plates burned is thereby obviated. It has been computed that 1/16 in. thick of incrustation causes a waste of 15 per cent. of coal; 1/8 in., 60 per cent.; 1/5 in., 150 per cent. Thus the Preservative avoids the great risks which are inseparable from scaled plates, lengthens the life of a boiler, and covers its own cost a hundredfold by economy of fuel. It is entirely harmless, and has no injurious action on metals. It can be put into the feed tank or boiler, as may be most convenient. Sold in drums and casks bearing the Trade Mark, without which none is genuine.

BELL'S ASBESTOS YARN and SOAPSTONE PACKING for Locomotives and all Stationary Engines running at very high speed with intense friction. Sandwell Park Colliery, Smethwick, 1st February, 1884.

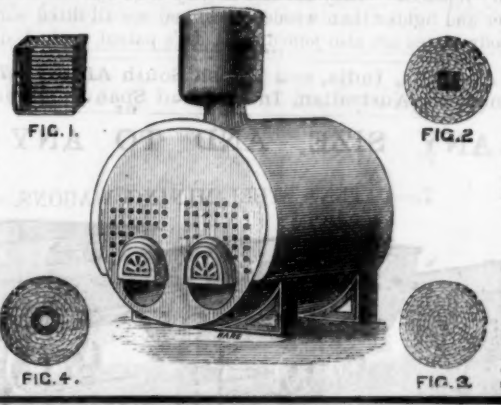
To Bell's Asbestos Works.

Dear Sirs,—I have much pleasure in stating that I have used your Asbestos Packing for the last 13 months for our large winding engines which are running night and day, and also for the fan, pumping, and hauling engines at the above Colliery, and during that period we have not used more than one-third the Packing we had formerly; and this I attribute to your Packing on account of its great durability and general excellence of quality.—I am, dear Sirs, yours faithfully,

THOMAS WINTER, Colliery Engineer.

BELL'S ASBESTOS.

The goods of this house are of the highest quality only, and no attempt is made to compete with other manufacturers by the supply of inferior materials at low prices. All "home" orders should be sent direct to the undermentioned depôts and not through Agents or Factors.



BELL'S ASBESTOS BOILER AND PIPE COVERING COMPOSITION, for coating every class of steam pipes and boilers, non-combustible and easily applied when steam is up; adheres to metals and preserves them from rust; prevents the unequal expansion and contraction of boilers exposed to weather; covers 50 per cent. more surface than any other coating, and is absolutely indestructible. It can be stripped off after many years' use, mixed up with 20 per cent. of fresh, and applied again. The composition is supplied dry, and is only to be mixed with water to the consistency required for use.

A Horizontal Boiler, 17 ft. 6 in. long, 15-H.P., gave the following results:—

Temperature on Plates - - - 136 deg.
" " Covering - - - 94 deg.

One ton of coal was saved per week, and although the fire was raked out every evening 20 lbs. of steam were found in the boiler next morning.

The following Testimonials refers to this Covering:—

Offices of the Wimbledon Local Board, Wimbledon, Nov. 28th, 1883.

Dear Sir,—It may interest you to know that we save exactly 40 per cent. in fuel through using your covering. Yours truly, W. SANTO CRIMP, C.E., F.G.S.

The Tamar and Kit Hill Granite Company (Limited),
Gunnislake, Tavistock, 5th April, 1884.

Mr. John Bell, Southwark, S.E.

Sir,—I have much pleasure in stating that the Asbestos covering applied by you to the boiler of our travelling crane at Kit Hill has yielded most remarkable results. Since it has been in use we have saved fully half our coals, and have effected a great saving in the time it takes to get up steam, which is often a matter of great importance to us. I should add that the crane runs on high gantries, and is fully exposed to all weather. I have formed the highest opinion of your Asbestos as used for this purpose, and as you are aware, have had another boiler similarly covered, though it has not since been used. I can most strongly recommend the material.

I am, Sir, yours faithfully, W. J. CHALK, Assoc. M. Inst. C.E., Engineer and Manager.

BELL'S ASBESTOS and INDIA-RUBBER WOVEN TAPE and SHEETING, for making every class of Steam and Water Joints. It can be bent by hand to the form required without puckering, and is especially useful in making joints of manhole and mudhole doors. It is kept in stock in rolls of 100 ft., from 1/2 in. to 3 in. wide, and any thickness from 1/16 in. upwards. Manhole covers can be lifted many times before the renewal of the jointing material is necessary. The same material is made up into sheets about 40 in. square, and each sheet bears the Trade Mark, without which none is genuine. It is very necessary to guard against imitations of this useful material, and to secure themselves against being supplied with these inferior articles as my price, users are recommended to see that every 10 ft. length of the Asbestos Tape purchased by them bears the Trade Mark.

BELL'S SPECIAL LONDON-MADE ASBESTOS MILLBOARD, for Dry Steam Joints, made of the best Asbestos fibre, is well-known for its toughness and purity, and is absolutely free from the injurious ingredients frequently used to attain an appearance of finish, regardless of the real utility of the material. Made in sheets measuring about 40 in. square, from 1-64th in. to 1 in., and 1/2 millimetre to 25 millimetres thick. Each sheet bears the Trade Mark.

The following copy of acceptance of tender refers to above:—

Department of the Director of Navy Contracts.
Admiralty, Whitehall, S.W., 17th May, 1884.

Sir,—I have to inform you that your tender for Asbestos Millboard has been accepted.—Mr. John Bell. JOHN COLLETT, Director of Navy Contracts.

BELL'S ASBESTOS EXPANSION SHEETING (PATENT). This Sheeting is another combination of Asbestos with India-rubber, giving to the steam user the special advantages of both materials. The India-rubber Washer is protected from the action of heat and grease by an outer coating of vulcanised Asbestos Cloth, thus producing an excellent joint where expansion and contraction render other materials unserviceable. This material is admirably suited to steam pipe joints and every class of valve. Valves made of this material are very durable, as they are not subject to injury by oil.

BELL'S "ASBESTOS LUBRICANT"

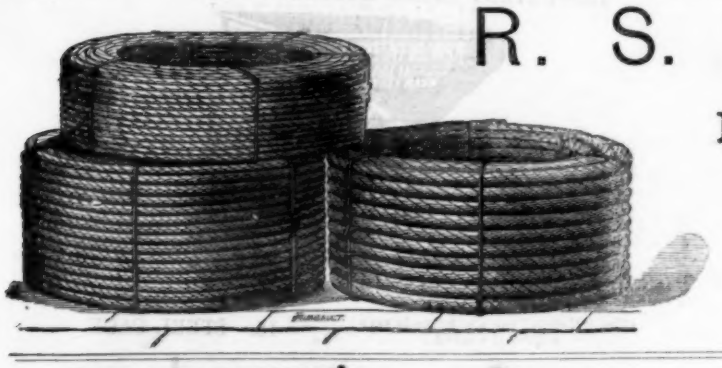
"REGD"

ILLUSTRATED PRICED CATALOGUE FREE ON APPLICATION TO

BELL'S ASBESTOS WORKS, SOUTHWARK, LONDON, S.E.

OR THE DEPOTS—118a, SOUTHWARK STREET, S.E.,

Victoria Buildings, Deansgate, MANCHESTER. 11 and 13, St. Vincent Place, GLASGOW. 39, Mount Stuart Square, CARDIFF. 21, Ritter Strasse, BERLIN.



R. S. NEWALL AND CO.,

Sole Patentees of Untwisted Wire Rope.

Iron & Steel Ropes of the highest quality for Collieries, Railways, Suspension Bridges, &c.

PATENT STEEL FLEXIBLE ROPES AND HAWSERS.

IRON STEEL, AND COPPER CORDS. LIGHTNING CONDUCTORS.

COPPER CABLES of high Conductivity for Electric Light and Power.

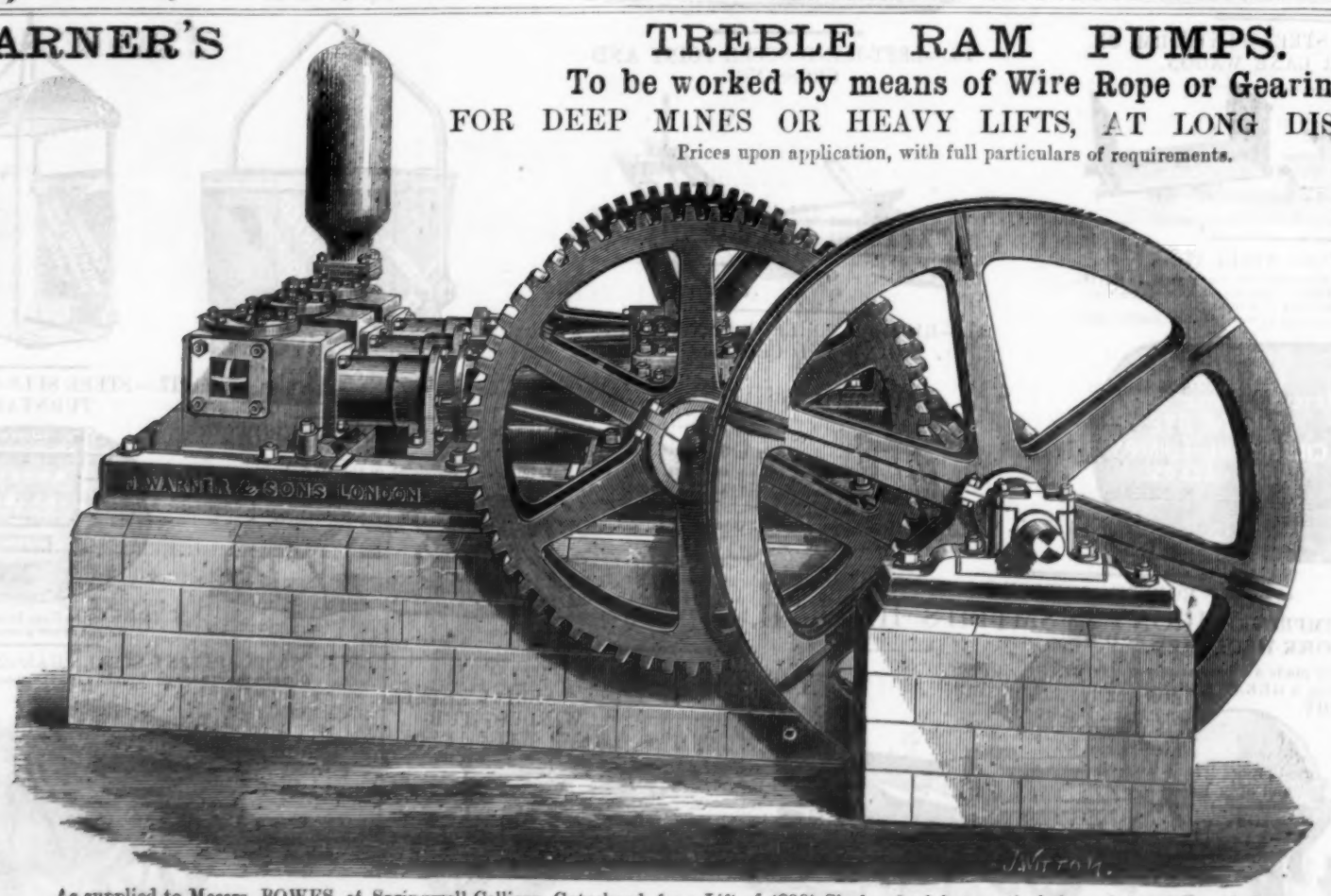
London: 130, STRAND, W.C. Liverpool: 7, NEW QUAY.
Glasgow: 68, ANDERSTON QUAY.
MANUFACTORY: GATESHEAD-ON-TYNE.

WARNER'S TREBLE RAM PUMPS.

To be worked by means of Wire Rope or Gearing.

FOR DEEP MINES OR HEAVY LIFTS, AT LONG DISTANCES.

Prices upon application, with full particulars of requirements.



As supplied to Messrs BOWES, of Springwell Colliery, Gateshead, for a Lift of (600) Six hundred feet vertical through two miles of pipes.

JOHN WARNER AND SONS, THE CRESCENT FOUNDRY, CRIPPLEGATE, LONDON, E.C.

R. HUDSON'S

Patent Steel Trucks, Points and Crossings,

PORTABLE RAILWAY, STEEL BUCKETS, &c., &c.

Telephone No. 14.
In connection with the Leeds Exchange, and all the principal Hotels and places of business in the town.

GILDERSOME FOUNDRY, NEAR LEEDS.

(Near Gildersome Station, G.N.R. Main Line, Bradford to Wakefield and London, via Laisterdyke and Ardsley Junctions.)

Registered Telegraphic Address:—
"GILDERSOME, LEEDS."
A. B. C. Code used.

UPWARDS of 25,000 of these Trucks and Wagons have been supplied to the South African Diamond Mines; American, Spanish, Indian, and Welsh Gold, Silver, Copper, and Lead Mines; Indian and Brazilian Railways, and to Railway Contractors, Chemical Works, Brick Works, and Coal and Mineral Shippers, &c., &c., and can be made to lift off the underwork, to let down into the hold of a vessel, and easily replaced. They are also largely used in the Coal and other Mines in this country, and are the LIGHTEST, STRONGEST, and most CAPACIOUS made, infinitely stronger and lighter than wooden ones, and are all fitted with R. H.'s Patent "Rim" round top of wagons, requiring no rivets, and giving immense strength and rigidity. End and body plates are also joined on R. H.'s patent method, dispensing with angle-irons or corner plates.

Patented in Europe, America, Australia, India, and British South Africa, 1875, 1877, 1878, 1881, and 1883.
N.B:—The American, Australian, Indian, and Spanish Patents on Sale.

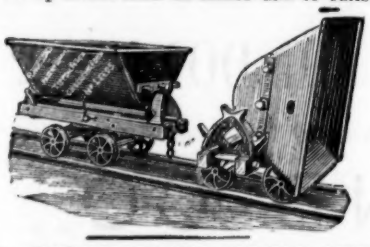
CAN BE MADE TO ANY SIZE, AND TO ANY GAUGE OF RAILS.

1.—PATENT STEEL END TIP WAGONS.

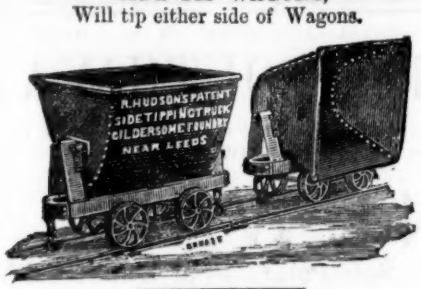
7.—PATENT STEEL MINING WAGONS.

12.—PATENT STEEL HOPPER WAGON, WITH BOTTOM DOORS.

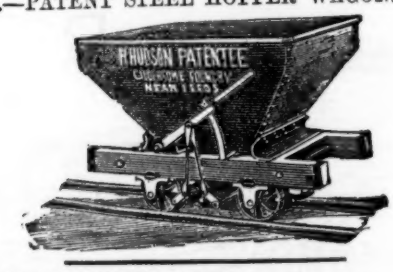
2. PATENT UNIVERSAL TRIPLE-CENTRE STEEL TIPPING TRUCK,
Will tip either SIDE or either END of rails.



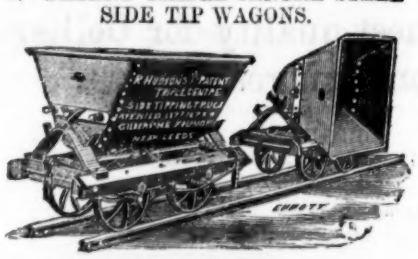
8.— PATENT DOUBLE-CENTRE STEEL SIDE TIP WAGONS,
Will tip either side of Wagons.



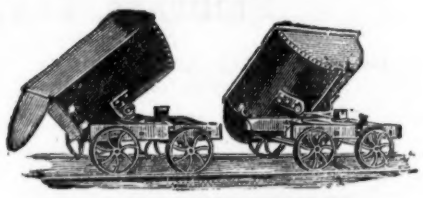
13.—PATENT STEEL HOPPER WAGON.



3.—PATENT TRIPLE-CENTRE STEEL SIDE TIP WAGONS.

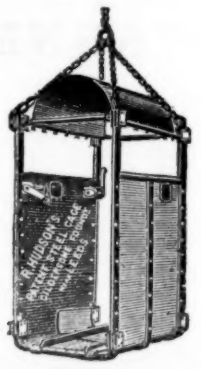


9.—PATENT STEEL ALL-ROUND TIP WAGON.

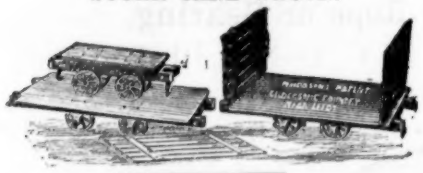


14.—SELF-Rrighting STEEL TIP BUCKET.
(The "CATCH" can also be made SELF-ACTING if desired.)

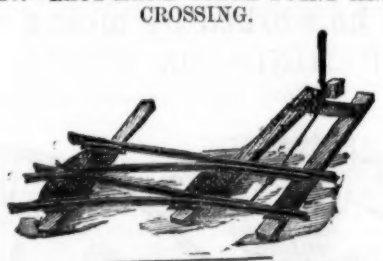
15.—STEEL CAGE.



4. -PATENT STEEL PLATFORM OR SUGAR CANE WAGON.

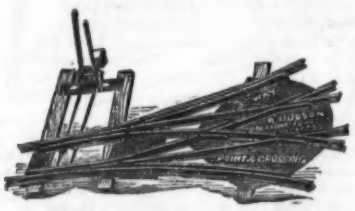


10.—LEFT-HAND STEEL POINT AND CROSSING.



5.—PATENT STEEL CASK.
As supplied to H.M. War Office for the late war in Egypt).
DOUBLE the STRENGTH of ordinary Casks without any INCREASE in weight.
(Made from 10 gals. capacity UPWARDS to any desired size.)

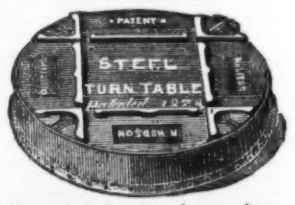
11.—RIGHT AND LEFT-HAND STEEL POINT AND CROSSING.



16.—PATENT STEEL WHEELBARROWS.
Made to any Size.
Lightest and Strongest in the Market.

A great success.

17.—STEEL SELF-CONTAINED TURNTABLE.



(Also made in CAST Iron for use where weight is not a consideration.

6.—ROBERT HUDSON'S
PATENT IMPROVED IRON SMITH'S HEARTH.
NO BRICKWORK REQUIRED.
A Special quality made almost entirely in STEEL, effecting a GREAT SAVING IN WEIGHT.

Large numbers in use by all the principal Engineers in this country and abroad.

No. 19.—PATENT STEEL CHARGING BARROW,
DOUBLE the STRENGTH & much LIGHTER than ordinary Barrows

18.—"AERIAL" STEEL WINDING TUB.

Largely employed in the South African Diamond Fields.

ONE man can EASILY tip ANY WEIGHT in these wagons.

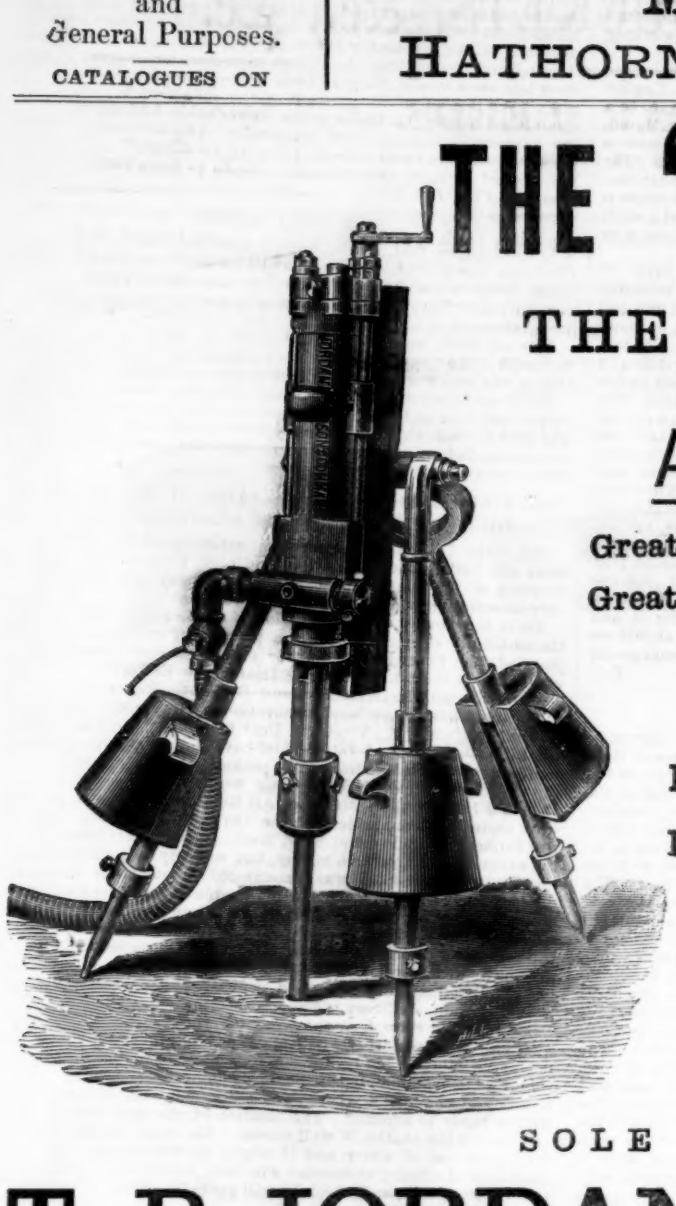
ALL KINDS OF BOLTS NUTS, AND RIVETS MADE TO ORDER ON THE PREMISES

Pumping Engines for Mines, Water Works, Sewage Works, and General Purposes.
CATALOGUES ON

PUMPING & MINING MACHINERY.
HATHORN, DAVEY, & CO., LEEDS.

Hydraulic Pumps, Winding Engines, Air Compressors, Man Engines, Capstans, &c., &c.
APPLICATION.

THE "ADELAIDE" ROCK DRILL.
THE BEST IN THE MARKET.



ADVANTAGES.
Great Simplicity and Durability. Great Strength and Portability.
Great Economy in Consumption of Air. High Rate of Drilling.

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UTILISATION OF CULM, OR COAL WASTE.

At the meeting of the Scranton, Pa., Board of Trade on Nov. 25, the president, Mr. J. A. Price, delivered an address on the subject of culm, and its utilisation as a fuel. In the course of his remarks he said: It was proper that they should maintain an eternal vigilance in regard to the methods of culm utilisation. Situated as they were upon one of the most extensive of anthracite coal fields, it was reasonable to expect that many of the problems would be solved there. Agitation would stimulate attention to the subject, and might lead to the present enormous waste being put to beneficent and useful purposes. Germany, France, and Belgium were still devoting themselves to various kinds of cements—manufacturing the waste into briquettes by mixture and pressure for commercial purposes. Coal tar and asphalte are used, but the effort seems to be perpetually embarrassed by the cost of production, which does not allow of favourable competition with coal in the market. There was progress in the right direction, however, in their country. Machinery for making a finer selection of material than has ever before been the case is now in use. A few years ago chesnut size was the smallest extracted, then pea size followed, and later still what is known as buckwheat size. One smaller size yet is contemplated, which might be called pin-head size. When there is yet no further possible mechanical subdivision there is still a vast waste. By the application of steam pressure, blast and mechanical grates, part of this might be and was used, but the question still remained over and above these economic uses of waste, What shall be done with the residue of output over consumption in its most favourable aspect? The combustion of carbon by its union with oxygen must take place before any force can be derived. The fine dust has all the elements of usefulness of the best coal in the bed; it only awaits the mechanical means of extracting the imprisoned energy. The lump of coal in the furnace only burns upon its exterior surface while the internal mass is without activity. The dust is but the infinite subdivision of the lump. The surface presented in the powdered state, for the action of the oxygen is much greater than in the mass of coal, hence it was reasonable to suppose that it possessed in reality a larger element of usefulness, and that the consumption of coal in the lump was not the best use of the fuel. It was the lecturer's firm conviction that powdered coal was to be the fuel of the future. He thought that the introduction of the fuel to the furnace by a proper method of stacking, and corresponding adaptation for the supply of oxygen and hydrogen, a process that must be automatic and continuous, solved the question. He was also satisfied that the heat energy of 1 lb. of powdered coal was several times greater than that of the same quantity in mass. The purely mechanical difficulties once removed they would have the vast culm deposits transformed into value. The assertion that waste anthracite may be used with practical effect in the preparation of land for agricultural purposes may at first startle some who are otherwise credulous as to the possibilities of culm. He believed such to be the case however.

A dark soil will sustain a more vigorous existence in the plant than a light soil, other things being equal. The reason for this is apparent when it is considered that dark colours absorb rays of light and light colours reflect them. The more sunlight that can be absorbed by the earth and the plant, the more vigorous the growth. The myriad rootlet mouths of the plant will discover the hidden ray and devote it to its use. The dark coloured soils are warmer in cold periods, and they are colder in hot, by reason of the lessened reflection from the surface. Every argument is in favour of the dark soil. Witness the richness in growth of the soils made dark by the carbon of decaying vegetable matter in the great West and in bottom lands generally. The colour partially accounts for the vigour of the soil. On all dark soils the season begins earlier and lasts later. The dark soils imprison the sunshine by absorption and hold it for gentle distribution to the need of the plant, while from the light soil it rebounds with arrowy and destructive intensity.

The lecturer continued—If we examine the leaf of a plant we discover that the upper surface has a glazed, hardened, or shield-like quality, but underneath it is soft and porous. It receives its substance from below. Hold a polished surface under the leaf with the sun's rays playing upon it and reflected beneath, if a confirmation is desired. The sickening effects will soon become manifest. A light coloured earth, in proportion to the degree, does the same thing in the very same way. It tends to exhaust the natural vigour of the plant. The introduction of this prepared material will also tend to make the soil more soft, porous, and spongy, which in turn fits it become the storehouse from which vegetation is fed. The use of carbon as an absorbent is unquestioned. The preparation of culm waste for agricultural purposes may and sometimes will, doubtless, be supplemented by its admixture with the sewage of cities, thus utilising two great wastes, while the destructive tendencies of sewage discharges will in a measure be diminished. But it is not my purpose to dwell at greater length upon the important features of the work of utilisation.

In conclusion, he said sufficient has been advanced to merit attention. The purpose of this presentation is that this board of representative business men, appreciating the folly, if not the crime, of allowing the waste of dust coal to go on indefinitely, shall institute measures at once, invoking the aid of the State in investigation, examination, and experiments. An appropriation of public moneys to this end can never be misplaced, and may result in untold advantage to the resources of the State. A commission with means to conduct the investigation thoroughly and persistently may be asked of the coming Session of the Legislature. The question is now before you. It remains with you to say whether the aid of the State be asked upon this most important and vital question of social and material economy.

Compendious Calculator.—There are almost innumerable calculations which are required in every day business that can be far more speedily made by some empirical method than by the ordinary book rule under which they would naturally fall, and in O'Gorman's Intuitive calculations these empirical methods are carefully arranged and systematised. The popularity which the work has acquired may be judged of by the fact that it has now reached its 26th edition—Compendious Calculator, or easy and concise methods of performing the various arithmetical operations required in Commercial and Business Transactions. By Daniel O'Gorman. 26th edition, revised by C. Norris. London: Crosby Lockwood and Co., Stationers' Hall-court—which is certainly as useful as any of its predecessors, and appears to have been most carefully revised. As the volume contains calculations useful in the wool trade, in the flour trade respecting the carriage of goods by railway, in the spirit trade, in mixing commodities to goldsmiths, silversmiths, and chemists, in dealing with land, in the timber trade, in artificers' work, and in the calculation of wages, interest, and so on it will be acceptable to almost everyone. The amount saved in time and labour in making his business calculations will repay the cost of the book in a very brief period.

Original Correspondence.

GUINEA COAST GOLD MINING COMPANY.

SIR,—Nearly 10 months have elapsed since the last general meeting of this company, and during all that time the directors, true to that policy of secrecy which they adopted about two years ago, have not given the shareholders a single scrap of information as to the progress and prospects of their new venture. No doubt they have received news from "the mines," which, whether good or bad, would have interested the shareholders, and which they were entitled to be informed of, but it has not suited the purposes of the board to communicate this news to us. We may, therefore, be well assured that it has been unsatisfactory. I know how long-suffering shareholders generally are, but surely it is time that we should seriously ask ourselves whether we will allow men, who have proved themselves to be not only without ordinary business capacity, but capable of conduct towards the shareholders which nothing can excuse, any longer to mismanage the company's business, and spend, as they most certainly will, if we let them, the little remnant of our capital without any result. Let me recall some of the salient facts connected with this unfortunate company, and I ask my fellow shareholders to give these facts their most serious consideration. They will remember that this company was formed to work a rich gold reef which it was said had been discovered at Izrah.

I do not know who was the original vendor of the property, but shortly before the prospectus was issued it had been bought by a syndicate, of which Mr. Johns (the Chairman of this company) was a member. Notwithstanding the flaming accounts of the vendor's agents, he, at any rate, had no very exalted idea of the value of the reef, for he sold it to the syndicate for a very small sum—only a few hundred pounds. As soon as the company was floated the reef was purchased from the syndicate by the directors for 75,000*l.*, by which operation Mr. Johns and his friends netted more than 70,000*l.* It will be observed that Mr. Johns in this transaction was at once vendor and purchaser, a sufficiently singular position one would think to induce the directors to be especially careful not to depart from the usual course, or neglect those precautions which are invariably taken by purchasers. Will it be believed that in the face of the fact that the vendor was willing to take a few hundred pounds for his valuable reef, our directors (having no other evidence of its value other than that afforded by the vendor's own agent's report) actually paid 75,000*l.* for the property? In fact, they really had no unbiassed and reliable evidence that the reef had any tangible existence (we now know it had not). Remember that two of the directors were city men well versed in the ways of the world. Was any conduct ever more fatuous? How is it possible to defend it? It may be urged that as the syndicate was satisfied with the vendor's statements, the directors might well be satisfied too. But the interests of the syndicate and of the company were by no means identical. The money which the syndicate risked was their own, and if they chose to speculate with it no one could say them nay. The capital of the company, however, was trustmoney, and the directors were certainly bound to take, at least, as much care and precaution in laying it out, as anyone of them would personally have exercised had he been buying on his own account. But—and this is the most important fact—the question whether there was or was not a rich reef was quite immaterial to the syndicate, if they could find a purchaser who would buy the property without any proper examination, for that examination would in any event involve a large outlay, which would be useless if the report was favourable, and if unfavourable the examination would be simply destructive to the objects of the syndicate.

To the company, however, this question, reef or no reef, was absolutely vital, as the directors well knew, and therefore, their purchase of the property without even first ascertaining the bare existence of the reef (to say nothing of its actual worth) seems to me to be one of the most rash, reckless, and astounding acts of folly ever perpetrated, even by a gold mining board. What do the shareholders think? Just fancy any member of this board buying a coal mine with the intention of working it for his own benefit, and imagine him paying, say, 10,000*l.* for it without ever having seen it himself or having had it examined by some competent and disinterested person on his behalf. Why the man who did such a thing would have his friends praying for an enquiry *de lunatico*, and no wonder.

But it may be argued further that the interests of the directors and shareholders were identical, and that, therefore, the directors might be trusted to guard the interests of the shareholders, because their interests were, in fact, the directors' interests. That is not so, however. The directors' fees, if the company could only be kept afloat for two or three years, would recoup all of them their outlay for the qualifying shares, and, as to two of them, the mere floating of the company would put a very large sum into their pockets; so that the directors practically ran no risk whatever of loss, and they will, in fact, lose nothing, whilst the shareholders, as a body, will, as they will find, lose every penny of their money. But the rash and reckless conduct of the directors did not end in the agreement to purchase a reef of the existence of which they had no unprejudiced evidence. Their extraordinary infatuation led them not only to accept the vendor's statements as absolutely true without examination, but they did not even require him to covenant, or guarantee, that the reef really existed, so that, when it was discovered that they had paid him for absolutely nothing, they were left entirely at his mercy. What do the shareholders think of that as an exhibition of business capacity?

Then, having bought the reef, they paid one of their number 800*l.* to go out and take possession of it! Was there ever a more shameful waste of a company's funds? Why their mining engineer could have done it just as well without the extra expense of a penny! Such is the way in which this board has shown its business capacity. Now, let me remind the shareholders how they thought it right and decent to treat us, when they found that through their unpardonable neglect they had thrown away 85,000*l.* of our capital, for they spent 10,000*l.* on the worthless reef. At least as soon as the beginning of March, 1883—I will prove this presently—the directors were satisfied that the rich reef was a myth, and they had arranged to work another 70 miles away. They had searched for 12 months in vain for the rich reef; they had assayed samples of quartz sent home from the property without any result, and they had tried the hydraulic process also without result; and they had, as I have said, resolved to abandon the property. What do they do? Do they call the shareholders together—recollect they are simply the servants of the shareholders, and inform them how things stand, and what they propose to do? By no means such a straightforward and proper course did not commend itself to these gentlemen. What they did was to resolve to keep the shareholders in the dark, and, if necessary, to state what was not justified rather than allow any inkling of their plans to reach those most interested in what they were doing. They issued a report, which was shortly a tissue of excuses for the small result achieved at the mines up to that date, but which expressed hopes of better things in the future, and that was the line taken by Mr. Johns, the Chairman, at the general meeting (in 1883) that followed. Enquiries were made by shareholders between March and October 1883, as to how things were progressing, but the directors persistently refused to give any information, upon grounds obviously improper, as I could show, if necessary, by Mr. Johns' own statements.

However, in October, 1883, a circular was issued to the shareholders, in which the directors after saying that "they beg to give an account of the operations which have been going on at the mines since the date of the last general meeting" (this statement should be carefully noted) go on to speak of the hopeful appearance of things at "the mines", and they also speak of "the reef." In November they issue another circular telling of still better news from "the mines."

Now, as they had up to this time more carefully concealed from the shareholders the existence of any mines, other than those at Izrah, it is perfectly clear they intended the shareholders to believe that "the mines" they referred to in the circulars were, in fact, the Izrah mines, for the shareholders knew of no others, and, therefore, they could only apply the information as relating to these and, mark this, the directors knew that they could only so apply it. Well, what can be said for conduct such as this? What claim can men who can act thus have to be considered honourable men? How is it possible for shareholders to trust or feel any confidence in a board which can deceive them in this way?

Imagine "The Southern Chalk Quarries Company" being formed to work a chalk quarry at, say, Brighton. Suppose at the general meeting held about a year after the company was formed the directors report that owing to various causes not much had been done at "the quarries," but expressing hopes for better things in the future, and imagine the directors about six months later reporting to the shareholders that everything was going on well at "the quarries," and then imagine that six months later still, it turns out that as long ago as at the time of the first general meeting, the directors had abandoned the quarry at Brighton, and had ever since been working one at Folkestone.

I say, imagine all this, but such a thing would be impossible; no directors would dare to act in such a way as regards an English mine, and why should it be suffered and allowed with regard to a foreign one? I said above that certainly, as soon as early in March, 1883, the directors had determined to abandon the Izrah Mines—a comparison of dates will show that this must have been so. The general meeting of 1883 was held on March 5. Now, in the circular of October an extract from a letter from the manager at the mines is given, which is dated April 20. In that extract he speaks of a shaft and drifts sunk and driven on the reef. That reef, was as we now know, the new reef.

From March 5 to April 20 there were six weeks and four days. It takes three weeks for letters to reach the Gold Coast, and probably another week to reach the mines. If, therefore, the directors had written to the manager on the day of the general meeting he could not have got the letter until March 26 at the very soonest. Now, I ask anyone who knows anything of the country, and the difficulty of transporting tools and stores, and getting the necessary tackle fixed (to say nothing of arranging for labour) 70 miles away from where the work has been going on, whether it was possible to do all this, and sink a shaft and drive levels within three weeks and four days? I need not press this point. I am quite sure the directors will not now venture to insist on the truth of their statement, that it was after the general meeting in 1883 that they resolved to abandon the Izrah reef. It is almost certain that they had already abandoned it at that date, and, for reasons best known to themselves, had determined carefully to conceal the truth from the shareholders. Such are some of the facts. Are my brother shareholders of opinion that the present board of directors worthily represents them? Are the directors' ideas of what is business-like and honourable, shared by the general body of shareholders? If yes, I am sorry for it, and have nothing more to say. If no, then let me ask—why should we any longer allow such men to misrepresent us and mismanage our affairs?—*New Broad-street, Dec.* 16. P.

SOUTH AFRICAN DIAMOND FIELDS.

SIR,—For some time past the owners of South African diamondiferous property have been gradually unloading themselves of their stock on British capitalists, who are not acute enough to see that the zenith of South African mining prosperity is passed, and that in the near future the Kimberley, the De Beer's, Dutoitspan, and Bultfontein will be as totally unable to yield profits as the Indian gold mines. In order that my views may be better understood permit me to repeat a few statistics, although they may not be quite new, with regard to the operations of last year and the result of them. The quantity of blue ground hauled out of the Kimberley Mine last year was about 350,000 loads, and the aggregate weight of the diamonds obtained was 947,877 carats. The average value of these diamonds was 22s. per carat, giving an approximate value of 1,044,000*l.* The number of men employed on an average in the claims was 252 Europeans and 1198 natives; the average number employed on the floors was 167 Europeans and 915 natives. The wages paid averaged about the same as in 1882—from 5*l.* to 8*l.* per week to Europeans, and 30s. per week, with lodgings and wood, but not food, to natives. The Kimberley Mine is described as an almost circular opening of comparatively limited area, contained within a presumably running wall of basaltic rock, and probably many hundred feet in thickness. The question of the future working of the mine has been earnestly discussed, in consequence of the falls of the reef. Opinion differs upon the subject, but good authorities appear to consider that what is required is to carry on reef removal operations concurrently with mine working, and in advance of probable reef slips. As regards Old De Beer's Mine, the estimated quantity of blue ground hauled out of it in 1883 was 700,000 loads, of 16 cubic feet each. The aggregate weight of the diamonds obtained was 426,728 carats. Reef was removed to the extent of 71,847 cubic yards, at a cost of 25,268*l.*, while the water pumped out was estimated at 10,950,000 gallons, its pumping costing 10,800*l.* There were only two slips of reef of any consequence in 1883 in Old De Beer's, but one slip caused the death of five natives. The daily average number of persons employed in the mine last year was 96 Europeans and 661 natives in the claims, and 101 Europeans and 602 natives on the floors. The rates of wages paid here were about the same as those carried on in the Kimberley mine. The area of diamondiferous ground at Old De Beer's is very extensive as compared with the Kimberley Mine; at the same time the blue ground of Old De Beer's is not so rich as that of the Kimberley Mine in the production of gems. The number of claims in the Dutoitspan Mine is returned at 1531, of which 1395 were more or less worked in 1883. About one-third of the claims were worked uninterruptedly, and upwards of 400 were worked for an average of 259 days, only those claimholders who had not proper appliances were idle last year. It appears that 17 more steam-engines were got to work in the Dutoitspan Mine last year, as compared with 1882, the increase in the aggregate force at work being 105-horse power. One mile of broad gauge and 14¼ miles of narrow gauge tramway were laid down in 1883. A valuation of the mine was made in 1883, and the total arrived at was 2,205,930*l.* The assessment of the Bultfontein Mine amounts to 660,185*l.* Work was carried on earnestly in the mine during 1883. The average depth of the mine where it is worked is about 150 ft., but there are certain blocks of claims on the north and northwest side where little work has ever been done, and about 40 claims which remain untouched. On the south and south-east side many claims have been cut out by reef, and it is feared that as the mine increases in depth more will share the same fate; at the present time a few claims are so covered with reef as to remain unworkable, so that the reef question will at no distant period demand the most serious attention of the claim-owners in the mine.

Taking these figures to be accurate, and there is no reason to suppose that they are not so, it would seem that something like 3,000,000 carats of diamonds are turned out annually from the four mines mentioned, and it is known but too well in the trade that the consumption in Europe and America does not reach 1,000,000 carats per annum, notwithstanding the fact that the low prices which have so long prevailed have induced the purchase of diamonds by persons much lower in the social scale than was formerly the case, and we all know the usual result of this movement—the rich reject the use of the vulgarised article, and the prices fall to the level of the plebeian users' means. If, then, the present output of the South African diamond mines continues the prices must be kept down to a figure that will make the earning of profits impossible; indeed, the Chairman of one of the companies which held its meeting this week honestly said that "idea of profits seemed quite out of the question and the directors had devoted their attention chiefly to keeping the concern out of further liabilities." The fact that most of the companies are really in this condition, although they show profits on paper and declare dividends accordingly, is the real cause why the South Africans are endeavouring to unload their stock on British capitalists, who will ere long repent their credulity if they suffer themselves to be persuaded into purchasing. It must not be forgotten that the wholesale diamond dealers of England, Holland, and elsewhere are almost without exception overcrowded with stones, rough and polished, and that many of them hold them at 20 per cent. above present prices, so that it is essential to keep up the delusion that diamond mining is profitable in order to prevent the fact being generally recognised that diamond prices are steadily and permanently declining.

As to the mines themselves the execrable condition in which they are is to some extent indicated by the telegrams and advices of slips and falls from time to time published in the *Mining Journal*, and observe how quickly these deplorable (?) accidents are utilised. No sooner is one announced in London than exertions are made to spread the news, and with it the opinion that the result must be to send up the price of stones, holders, of course, availing themselves of the opportunity to let a few slide at the price of the day, or even a little below, if a purchaser can be found. But in truth we can believe nothing that comes from South Africa through such interested sources; and the only interpretation of what is reliable is that if the output continues as at present the price of stones must constantly decline until even paper profits will become impossible; while, if the mines be, as some state, in such a dangerous condition that the price of stones will be favourably affected by the stoppage of the supply, it is beyond dispute that the British capitalists who buy the shares must lose their money, because even present supplies are such as to place "the idea of profits quite out of the question," and, therefore, diminished supply at a higher price—fewer carats and greater working expenses—must be more disastrous. The wholesale dealers' present stocks are equal to from seven to 15 years' consumption at the present rate, so that diamond mining prospects are decidedly gloomy.—*City, Dec.* 17. M. GOMPY.

WEARDALE MINES.

SIR,—I notice that at the annual meeting of this company the Chairman narrated the various difficulties which have had to be overcome, owing to the state in which the mines were left by the old company, and that the meeting agreed to a recommendation to apply for a reduction of lordships from 1-12th to 1-24th.

It is not much more than a year since this mine was brought out, and with it the promoters published reports from various engineers that it was well worth the 6000*l.* asked and received by them.

If the condition of things be as stated at the meeting, would the proper way not be to ask the promoters to refund the 6000*l.* which was paid to them on their representations, which now appear to be inaccurate, before coming to the landlord for a reduction of lordship?—*Glasgow, Dec.* 16. R. T. M.

LEADVILLE MINES—EXPLORATION WORK ON FRYER HILL—PROSPECTS OF THE OLATHE COMPANY.

SIR,—The Leadville Democrat in referring to the exploration work now being done on the north side of Fryer Hill, where the property of the Olathe Silver Mining Company is located, speaks very encouragingly of the prospects as follows:—

There is probably no other division of the Leadville district where the sinking of deep shafts for the purpose of exploration is more justified than Fryer Hill. This for divers reasons. The main ore chute crosses the centre from the Triangle on Eaton to the Climax. Toward the east the Matchless and R. E. Lee, Big Pittsburg, and other mines have established connection with Yankee Hill Mines. To the north the O.K., Virginius, Deer Lodge, and the lower ends of the Little Pittsburg and Little Chief have shown up large bodies of iron and low grade mineral, with pockets of high grade. Toward the west a good deal of prospecting work, done by the writer in 1878 and 1879, on the Kit Carson, All Right, and Nellie T., and later work under the management of the Chrysolite Company, upon the two former, Colorado Chief, Solid Muldoon, and others demonstrated the existence of large vein masses, but scarcely any pay ore, some low grade iron excepted, was encountered in numerous winzes and drifts. The belief that all the real valuable deposits are confined to a large *cul-de-sac* in the central line afore-mentioned, is hardly tenable on account of the broken-up condition of the whole vein, its cap and footwall or bedrock not excepted. That a leaching process may have created valuable deposits of chlorides is the belief of a good many miners, and it is good counsel which directs the enterprise for their discovery. The prospecting work in the shaft of Cummings and Finn, near the present Fryer Hill smelter, stopped in quartzite, the position of which makes it highly possible that against it may lie valuable ore bodies. A systematic course of prospecting, therefore, is laudable, but it should be done economically, and the building of new plants where there are so many old ones at disposal will probably be avoided. The location of the new shaft of Estey and Co., on the Olathe, is well chosen. He must prepare, however, for a good deal of water, and it might be wise to precondition the assistance of mining companies who have mines in and under water to the east of him, and which he will probably drain after he shall have gained a certain depth.

The Mr. Estey referred to above is a miner of large experience, and in his operations among the Leadville mines, has been exceedingly successful. It can, therefore, be assured, that if mineral in the Olathe territory can only be reached by deep sinking, that Mr. Estey will secure it, even if it should require a depth of several hundred feet to do so.—*Denver, Dec.* 2. J. FITZBRIND.

THE OSCAR GOLD MINE.

SIR,—The fluctuations in the prices of shares are sometimes not easy to account for. Take, for instance, Oscar Gold Mine. In July last (the value of the mine at that time being by no means proved as it has been since) the shares, with 7s. 6d. paid, were quoted higher than to-day, with 12s. 6d. paid, and the mine now proved beyond all doubt to be probably the most valuable in existence. Oscar, as it stands to-day, is taken altogether out of the catalogue of speculations, and those who invested in the shares may rest and be thankful. The capital is 75,000*l.*, in 1*l.* shares; of these 32,500 go towards purchase of the mines, but of the balance of 42,500, only 30,000 are issued, and the directors do not see any likelihood of requiring to issue the balance of 12,500, consequently the capital on which dividends will be paid is only 62,500*l.*

Compare the capital with some few other mines, for instance, Mysore (135,000*l.*), and will want more before they can do much; Montana 660,000*l.*, Lisbon-Berlyn 500,000*l.*, and a host of others. To pay a dividend of 20 per cent. on the present price of Oscar (20s. per share) would require 12,500*l.*; the same dividend on Mysore (35s. per share) would require 47,250*l.* It is cheering to read the good reports from Mysore; but that mine cannot be taken out of the catalogue of speculations, for there is no certainty about its continuance. No one is in a position to say that there are any reserves of rich mineral, although it is to be hoped such will be found in depth. Capt. Plummer, now of Mysore, it was who surveyed the Oscar before purchase, and he was well pleased with all he saw, which was not a tithe of what has been discovered since.

Now the reserves in Oscar are enormous, as Capt. Daw said at the meeting last week, "practically unlimited for very many years." The portion of the Oscar lode that has been proved is:—Depth of shaft, 17½ fms.; width of lode, 4 fms.; and length, 110 fms. Putting this into feet, 105×24×660, gives a mass of 1,663,200 cubic feet, which, multiplied by 150, as pounds to the cubic foot, and divided by 2000, to get the tons of ore, gives 124,740 tons—a nice little mass in itself, but there is no saying how deep it may go, for 17½ fms. is a mere nothing, nor how far in length; and over and above this there are 14 other lodes, some larger and richer than the Oscar lode, but all belonging to the Oscar Company.

The first crushing by the machinery on the mine produced over ½ oz. of fine gold (worth very nearly 4*l.* per ounce) to the ton of lode. This result was not arrived at with a thorough clean up; that will be done early next month, when, no doubt, the result will be still better, although ½ oz. may be said to be good enough. With a 1½ ton sample of picked ore the result was over 10 ozs. per ton, worth 3*l.* 19s. 2d. per oz. "That was taken from the west end of the lode in the shaft, but, of course, from its richest point." So wrote Capt. Daw. The 130 tons now crushed was taken indiscriminately, and not picked in any way out of a heap of 800 tons from Oscar lode. Now, take the value of the 124,740 tons; ½ oz. would give 2*l.* per ton, but as Capt. Daw puts the total expenses in Norway of producing the gold from the mine as at 10s. per ton of ore (subject to reduction when treated on a large scale), the net result is 30s. per ton, or 187,110*l.*, this, as before said, being only a portion of one out of 15 lodes.

There are the riches—there is no speculation about it—it is only a question of a rule of three sum—how many stamps, what dividend?

The engine-power on the mine is good for 60 stamps. There are now 20 working day and night, 30 more will be ready in February. They can then crush at least 1000 tons per month; this gives 25 per cent. dividend on the capital. The machinery on the mine has cost about 5000*l.* including erection, so that with double the power they can work 120 stamps, which will at a very low estimate do 2400 tons per month; still, that quantity would suffice to pay dividends of 70 per cent.—*Newcastle, Dec.* 15. A. S. O. S.

RAILWAY FREIGHTS.

Sir,—The commercial public generally has great reason to thank you for your article of Dec. 6, on this subject, and to us it is particularly well timed. The powers possessed by railway companies in matters of rates is far too elastic for the well-being of the community, but great as it is some companies strain it to the uttermost. Doubtless their experience is that traders will submit to extortion rather than evoke the tedious and expensive machinery of the law against a large railway company.

We have become the victims of an alteration of rates in a way which I hope, for the credit of railway companies, is unique. Our business is making and supplying flagging for paving footways, and about 18 months since we erected branch works in Leicestershire, on the Midland Railway, obtained their rate, and during the last 12 months that company has carried many hundreds, perhaps thousands, of tons of our flagging to London at the rate quoted; and we, considering the rate established, have expended a considerable sum in extending our works there; but almost as soon as they were completed the Midland Company informed us that our rate is to be increased nearly 40 per cent. at the end of this year. If they had never charged the lower rate we should not have provided for so large an output on their line, but they preferred to allow us to complete a large establishment before charging the higher rate. Surely such proceedings are unworthy of a great company.

It is to be hoped that the day is not far distant when the Great Northern Railway Company will obtain parliamentary powers to extend their system in the Leicestershire district, and that a fair competition may be the result. Ample evidence could easily be obtained, and a good case established in support of competing lines. The Midland Railway, which started in a small way with laudable objects, under the modest name of a district, has grown to be one of the largest undertakings in the kingdom, and a great monopoliser in parts of the largest manufacturing districts in the world, and there can be no doubt but that the establishmeut of fair rates and abolition of their monopoly would considerably relieve the present depression of trade H. Rogers,

Kingsland-road, Dec. 17. The Patent Victoria Stone Company.

LONDON AND BRIGHTON SHIP CANAL.

Sir,—Among the earliest subjects of discussion in the *Mining Journal*, and before the London and Brighton Railway was even authorised by Act of Parliament, was the canal projected by Mr. James, the assistant and colleague of the great Stephenson, to connect London with the English Channel near Brighton, and although the rapid development of the railway system threw the project into the shade, its importance has never been doubted, and the proposition has been from time to time revived. A favourable opportunity again presents itself for agitating the matter, since the Panama and Nicaragua Canals are attracting attention in America, and the Cronstadt and St. Petersburg Canal has just been opened in Russia. Capt. Gorringe, of the United States Navy, defends the Panama Canal, and in replying, Admiral Emmond writes:—Now, it seems proper to do away with any misconception in the minds of your readers growing out of the assertion of Capt. Gorringe that it was ever proposed in any Act of Incorporation asked of Congress to build the Nicaragua Canal with Government money. In the winter of 1880-81, a simple Act of Incorporation was asked, and nothing more, and conferring at the same time on our Government the moral and the material control of the work, so far as desired. The following winter a guarantee of 3 per cent. interest on $75,000,000 of bonds was asked—to be operative for 20 years, but only after the canal was open for traffic—and if in any one year the revenue of the canal exceeded the 3 per cent. guarantee, that the excess should be applied in liquidation of any moneys that had been paid by the Government to secure the stockholders in a 3 per cent. interest on their money. This was asked because M. de Lesseps had then a moneyed support, and was operating, and it was supposed would be a moral, but not at all a material support, to the canal when completed. The proposition for any guarantee was finally withdrawn, and yet a simple Act of Incorporation of the Maritime Canal Company of Nicaragua received no Congressional action, nor any apparent support from the Executive branch of our Government, notwithstanding petitions from all the Legislatures and cities of States bordering the Pacific coast? A former distinguished member of Congress, who recently paid me a visit, said that this lack of action and of support to the Nicaragua Canal Company was the most astounding thing in our political history. I have to add that no one at this time has pecuniary personal interests in the Nicaragua Canal. The concession generously given to our citizens has happily expired, and it cannot longer serve as an impediment to the construction of that work.

The canal from Cronstadt to St. Petersburg was opened for vessels of deep draft a couple of months ago, and there is now free passage for them not only through the main channel, but into the Neva river, close to St. Petersburg. The first Russian warship to enter that part of the Neva was the American-built cruiser Africa, 300 ft. long, commanded by Capt. Doubossoff. The canal is a work which is not only of both strategical and commercial importance for Russia herself, but one that must also considerably affect the sea trade of other countries with the port of the Neva. Hitherto the small fortified town of Cronstadt has always been the actual port of St. Petersburg for all vessels drawing more than 9 ft., and cargoes had to be lightered some 20 miles up the shallow waters of the river to St. Petersburg. The present canal is intended to obviate this transhipment, and thus to save a good deal of time and money to merchants and shippers. Sceptics there are who deny the advantages which are supposed to be conferred upon the commercial world by this undertaking, but impartial critics judge differently, and Russian opinion has decided that when this scheme is thoroughly completed and properly supplemented by new docks, harbours, and connecting links with the railways and rivers of the interior, it will be a boom calculated to benefit alike both Russian and foreign traders.

Vessels of deep draft have never yet been able to approach the capital. Various measures for overcoming this convenience have been broached and discussed ever since the foundation of Peter's city. Peter the Great himself planned a canal 15 fms. wide along the southern shore of the Finnish Gulf, from the Fontanka Canal, which runs through the town to Oranienbaum, opposite Cronstadt; but this appears to have been abandoned before completion. The plan of the present canal was matured between 1872 and 1874. The work was only actually begun in 1877-78, three or four years later, in consequence of injury suffered by the dredging machinery on its way from England. The canal is 26½ versts, or about 17 miles, long, extending from Cronstadt to the Island of Goutovieff, with a southern branch of 3½ versts long to the Ekaterinhoff Canal, which runs through St. Petersburg, and a northern channel entering the Neva. This part of the river has also been specially dredged for the passage of ships of war. About 7 miles of the canal nearest to St. Petersburg are enclosed within high banks or dykes, while the Cronstadt portion, about 10 miles, takes the form of a submarine channel 50 fms. wide dug in the bed of the gulf.

The enclosed portion of the canal varies from 180 to 240 ft. in width. The depth of the channel over the 1½ verst of the river bed dredged is 22 ft., and the depth of the southern arm 16 to 20 ft. A branch of Poutiloff's railway, connected with the main lines from St. Petersburg to the interior, runs along the broad southern dyke of the harbour. It is next proposed to join the Neva at a point above bridges toward Schlüsselburg by a secondary canal, which shall terminate at the new harbour and docks. This will enable boats and barges, mostly filled with grain from the interior of Russia, to discharge their cargoes directly at the port of export. With this supplementary communication Cronstadt will reassume its original character as a fortress, and the scheme of making St. Petersburg a seaport will be complete. Most of the work of excavation was done by nine bucket and grapple dredges, which removed on the average about 1200 cubic fathoms of soil per day. The Imperial decree ordering the construction was signed by the late Czar on June 1-13, 1874, and on Nov. 12-24, 1883, the present Emperor and Empress witnessed the introduction of the water into the canal. The cost of the work thus far is estimated at 10,265,400 roubles. The contractors were Messrs. Boreischa and Maximovitch, controlled by a special committee appointed by the Government.

The strategical importance of the new canal is expatiated upon by the Cronstadt Messenger, the official naval gazette, in a long article. Up to the present the Russian ships of war behind the forts at Cronstadt have had no water in which to fall back in case of an attack on the Cronstadt defences out of the way of the enemy's fire, as during the expedition of Sir Charles Napier. Now, as was shown during the recent naval manœuvres, they will be able to take refuge in the canal, if necessary, right up to St. Petersburg. But the more important consideration is that large ships of war constructed or kept there in reserve can in future be sent down the canal to Cronstadt, fully equipped, without the need of floating docks, and all ready for sea or to encounter the enemy.

Now, if the Panama, the Nicaragua, and the Cronstadt-St. Petersburg Canals are worth even speaking of, how much more could be said in favour of the Brighton and London project? Shoreham Harbour could be very readily improved and enlarged, so as to receive the whole of our India, China, and Australia, as well as our foreign trade; and by bringing the ships thence through the Brighton and London Canal the chief dangers of the Channel would be avoided, and nearly a week's time would be saved. Nor is this all, for the construction of the canal would cause Shoreham Harbour to be enlarged into a great port, and much of the shipping would not come to London at all, but would make Shoreham the dock for London. Indeed, I much doubt whether it would not be to the advantage of the London and Brighton Railway if they were to promote the establishment of large docks in Shoreham, and thus secure a goods traffic to London, which would greatly add to their present profits. I have Mr. James's pamphlet concerning the canal, and if the project be energetically taken up shall be happy to lend it to you to reprint.—*Brighton, Dec.* 16. Nautilus.

ON THE LIGHTING OF COAL MINES.

Sir,—Coal is King, and reigns supreme. In every department of the vast domain of physical science we are brought face to face with the fact that the extraordinary strides made during the present century are owing to the influence exercised by the utilisation of the stored solar heat of remote geological periods. Happily for England's greatness, Providence has blessed her with almost inexhaustible supplies of this precious fuel; and to this, indirectly, the Empire owes its position among the nations of the earth, and is enabled to hold free and rapid intercourse with her most distant colonies, thus binding with "hoops of steel" an Empire, the power and might of which overshadows all past political creations, and before which the kingdoms of antiquity hide their diminished heads. It were idle to emphasise what civilisation owes to coal, from the majestic steamship to the whirling dynamo—from steam to electricity the prime mover is carbon.

The annual output of coal in the British islands may be taken roundly at 170,000,000 tons, which distributed becomes the great sources of heat, light, and power, and an increment that cannot be estimated in the sum of human happiness. At the beginning of the present century a large proportion of the coal required was worked from pits near the outcrop, the mining of which was easy and beset with fewer dangers than surround the production of the vast quantity that is demanded by the markets of to-day. Mechanically no large and expensive appliances were necessary, and the coal was worked in zones of comparative safety. A great change has come over the miners' art, pits are sunk to depths of from 2000 to 3000 ft., in consequence of which the working collier is exposed to dangers in some respects unknown in the past. One notable point of difference arises from the fact that at least three-fourths of the quantity of coal now raised must of necessity be worked by the aid of safety-lamps. It is not a little curious to reflect that the propulsion of our huge ships, the rapid locomotive, and the thousand and one mechanical wonders that meet our gaze on every side depend for the foot pounds generated on the invention of Sir Humphrey Davy, and that without his lamp the treasures of the earth were sealed and beyond our reach.

The Davy lamp at present (with some modifications) is the ordinary means of giving light to the coal miner, for whether we examine the invention of Stephenson, Clanny, or the many busy brains that have been engaged in perfecting the beautiful discovery of Davy, it must be acknowledged that the cylindrical wire gauze surrounding an ordinary oil lamp flame remains the safety-lamp of to-day. For many years after the introduction of the Davy it was considered by the working miner that he possessed a means of insuring absolute safety from explosion; indeed, many of the most prominent mine managers shared in the delusion. This feeling of security that had taken hold of the mining world was somewhat rudely dispelled some 20 years ago by an explosion that took place in one of the best managed and ventilated collieries in the North of England. At the official enquiry into the probable cause of the accident one of the witnesses gave it as his opinion that the explosion arose from the ventilating current becoming overcharged with inflammable gas, owing to the accidental holing into some old workings, and that the velocity of the current had caused the explosion within the lamp to pass through the meshes of the gauze, and so explode the external mixture. This opinion was not shared by the other scientific witnesses, but it led indirectly to a series of experiments, which conclusively proved that every description of lamp in use in the district exploded when exposed to velocities that did not exceed the current in question.

It need scarcely be added that the result of these experiments, which were elaborate and carried out with every attention to scientific detail, had the immediate effect of inducing many of the most promising mining engineers of the day to devote an amount of attention to the subject that was probably without parallel from the time when the old flint mill was displaced by the invention of Davy and Stephenson. All the experiments and improvements were made upon the existing types, and it ought not to be a matter of surprise that nothing original or striking novel was the outcome. The first departure from the old style of lamp was made by two French engineers, who constructed an electric lamp the light of which was enclosed in a glass tube. This was the subject of many experiments in the county of Durham; and, although the illuminating power was equal to the lamps in use, yet the surface exposed by the tubes and the size of the detached battery were considered insuperable objection to its introduction into general use. Since this invention was tried in England, every advance has been on the old lines; and, although much has been accomplished, yet the method of lighting our collieries cannot be considered satisfactory. If, however, we turn our attention to what is being accomplished by our lively and versatile Gallic neighbours, we find that, by continual and untiring experiments, that an electric lamp has been invented that bids fair not only to revolutionise the existing system of lighting mines, but is so simple in construction and so easily manipulated, that is likely to supersede the existing type of railway lamp, and will prove invaluable for use on shipboard, as well as an elegant and brilliant mode of lighting our households.

As a mining lamp it seems to fulfil all the conditions requisite for yielding a bright and powerful light with perfect safety. In weight it is about that of an ordinary Clanny, it contains its own battery, it gives off the light of several oil lamps, is simple in construction, portable, economical, costing about a farthing an hour, is quite safe in all mixtures of gas and air, gives off no sparks, the light being incandescent, and consequently in vacuo it requires no more skill in management than a Stephenson, the intensity of its light is easily regulated, and its cost about that of the common Clanny. We shall hail with pleasure the introduction of this lamp into the mines of Great Britain, feeling assured that the increase of light and safety will guarantee its speedy adoption. We hope in our next to give your readers a more lengthened description and greater details.

Westminster, Dec. 17. Light and Safety.

ALMADA AND TIRITO COMPANY—VALUATION OF MINERALS.

Sir,—I am informed by wire of certain criticisms made at a late meeting of the Almada and Tirito Mining Company *re* the valuation of the stocks of ores, roasted products, argentiferous pig-lead, and mattes, remaining at their reduction works at the time of my leaving, about a year and a half ago. These stocks were duly handed over to my successor, and, with the exception of a pile of low grade roasted products, were all turned over in the second half of 1883. No intimation that any shrinkage in value occurred has reached me until now. I have not seen any account of the meeting.

It is highly mis-leading to re-estimate after a lapse of a long interval a remnant of a stock of ore whose net value depends on a given tariff of costs, by applying to it an utterly distinct tariff. The costs have very greatly increased since I left the property. I believe I am quite safe in saying that they are $8 to $10 per ton greater than during my management. Any remnant that may have been included in stocks valued, say, in May or June this year, would be subjected to a discount of working costs much higher than the one that ruled previously, the gross value would remain the same, the net value would be much less. The increase of working costs is the *bete noire* of the property. Good mining reports have been published by this company during the present year. The 100 lode, of which I am the discoverer, appears to have averaged 3 to 4 ft. wide, and to have carried a fair amount of ore, say, 10 to 12 tons per fathom. The value of the ore sent to the furnaces was, according to the reports, above the usual average, running 29 to 30 ozs. per short ton, about 7*l.* 12s. 6d. per English ton. The concern has had a new management. The mine appears to have been in a position to turn out easily 40 tons per day. May I ask what the financial result, irrespective of ore stocks for 1884 is? Were the costs more approximately what they used to be the result would be a good one; as they are now it is easy to see why neither ore blocks *in situ*, nor stocks in the yard, have anything like the value they previously had.

The practice of wet stamping ores destined for chlorine roasting was continued. This company is the only one I know of that does this. No important renovation of the mill took place, although it is 14 years old. I wrote repeatedly on these two matters before leaving, and my advice was not followed. The bad state of the mill causes severe losses in two ways; first, by increasing the cost of the treatment of the ores, and, second, by causing an undue loss of the silver contained, the ore not being properly stamped the extraction of precious metal is imperfect. The easiest way to account for a poor financial result is to transfer as much as possible of the fault to past management. Since the middle of June last the works have been run at half capacity, a procedure that can only be carried on with considerable loss; it still further increases the working costs, and still further lessens the net value of ores, both *in situ*, and in the ore yards. The result will be more deficiencies. Why, for some time past, were not the developments maintained so far in advance that on the exhaustion of one stope another was available?

I repeat that where the shoe really pinches is in the high mining and returning charges. Had they stood at their present figures during my administration the concern would have been shut down years ago. Amongst other items which have caused the great increase in the working costs per ton of ore we may cite—$1·50 due to abnormal rates of purchasing sulphur; $1 ditto firewood; $0·50 ditto salt; $4 increase in fixed charges on account of the small quantity of ore treated. Many of the most important articles of supply were not bought at the proper times. Generally, after awhile, the works were temporarily stopped for want of such articles. Small quantities were then obtained at enormous prices, and the spasmodic working resumed; no industrial undertaking can long sustain such treatment. All this, notwithstanding the fact that the new management received 4000*l.* to help put the stores department on a proper footing (no other manager ever received any financial assistance.)

Under proper administration there would not have been any deficiency on the original valuation of the ore stocks. I quite recently heard from the late manager that the present one employed utterly erroneous methods in the taking of his stocks; he had never done such work before, and was ignorant of the rudiments of it. His management had been severely criticised by the latter, but the entire staff of the mines and all the merchants would testify that his management was correct, and the present the incorrect one. He had written the board, and requested them to institute a comparison taking the evidence of the staff, and of the leading merchants. He further said he had late advices from the district which were unanimous in saying that the enormous increase in the prices paid for all materials was unwarranted and absurd, and that if a remedy could not be found operations could not be successfully continued. Ores carrying 29 ozs. to the ton, which formerly left a profit, were under the new system extracted and worked at a loss. J. H. Clemes.

New York, Dec. 1.

NORTH MEXICAN SILVER MINING COMPANY.

Sir,—Exception has been taken to an expression I used at the late meeting of the North Mexican Silver Mining Company. Speaking generally, I said—"You, as business men, must know it is the man and not the mine that makes the thing a success." Of course I was addressing debenture holders aware that the wealth of the Cusihuiriachic Mines had been proved on a large scale, and by independent analyses on both sides the Atlantic. But I desired to impress on my audience how much they owed to the managing director, Mr. Pulbrook, whose careful investigations in America led him to commence the reduction of the ore under the auspices of the most accomplished metallurgist in that continent. Under such management a mine comparatively poor will yield good results. In less capable hands the richest property may bring no riches to the proprietors.

Tonbridge, Dec. 18. H. Roper-Curzon.

MINING PROSPECTS IN UTAH.

That there will be a revival of mining operations in the near future the Southern Utah Times has no doubt. There are millions of dollars lying idle in the vaults of Eastern capitalists waiting proper investment. The mining business is better understood and more appreciated at the present day than ever before. We do not expect to see the days of Virginia City and Leadville, with their wild speculations in the rise and fall of mining stock, when fortunes were made and lost in a day, revived, but we do expect to see a revival in mining affairs as a legitimate business, where capitalists will make careful investments in gold and silver mines with the expectation of getting a fair return on their invested capital. On account of the many wild-cat schemes which have originated in the Rocky and Sierra Nevada Mountains during the past decade, Eastern capitalists have looked with a suspicious eye on everything relating to gold and silver mining. The day is past when the "speculator," with his mines, tunnels, shafts, and ore piles, "on paper," can dupe the Eastern man of money.

The shafts and drifts must be in the ground, and the ore in the mine. The man who buys a mine nowadays examines the property personally, or sends a trusted agent to act for him. A specimen with an assayer's certificate does not satisfy the purchaser as to the quality of the ore, but a sample from the ledge, assayed by his own assayer, is what our present day buyer will have. The days of White Pine excitement have gone for ever. The occupation of the old style prospector is gone. He will tell you of the good old times when he sold a hole in the ground over in Nevada for a fortune. He will tell of the time he received $200 or $300 a month, expenses and horses furnished by a Californian company, for prospecting and making locations. All that was required of him was to ride over the country, find a ledge, write location notices, and build little stone monuments on the corners of the claims. Poor fellow, he has been useful in his day; he has made trails through the wilderness, and pointed out localities in our wild mountain ranges where the precious metals are hidden, but, like the old placer miner, he will soon be a character in our past history. The prospector of the future has different duties to perform. He must not only find his ledge, but he must also stay with it, and, by the judicious use of pick and drill, show up an orebody that will pay to work. The

sooner our prospector will adapt himself to this new order of things the better it will be for him. While this changed state of affairs will sound the death knell of the mining stock speculator and the prospector, it will be an era of light for all citizens who desire to see our mineral country developed, and our mining operations placed on an equal footing with the legitimate industries of our country.

FOREIGN MINING AND METALLURGY.

There has not been much alteration in the rates current for iron upon the French markets, merchants' iron being still quoted at Paris at 5*l.* 12s. per ton. The Western of France Railway Company is about to let contracts for 25,080 tons of steel rails, together with accessories. It appears from the bulletin of the Committee of French forgemasters that during the second quarter of this year the Eastern of France Railway Company let a contract for 12,000 tons of steel rails to Longwy at 6*l.* per ton. An order for 14,000 tons of rails was also given by the Northern of France Railway Company to the Steelworks Company of France—2000 tons at 5*l.* 16s. per ton, and 12,000 tons at 6*l.* per ton. In the same period the Western of France Railway Company ordered 18 express locomotives from the Batignolles Company, while the Eastern of France Railway divided orders for 80 locomotives between the Alsatian Company and the Creusot and the Cail Works. The intelligence forthcoming with respect to the German iron trade is extremely scanty. In the first nine months of this year Germany exported 165,384 tons of pig and cast iron, 119,541 tons of wrought iron, 105,765 tons of rails, and 155,632 tons of wire. September figured in these totals for 16,298 tons, 13,299 tons, 15,353 tons, and 19,516 tons respectively. Axles and tyres were also exported from Germany in the first nine months of this year, to the extent of 8383 tons, September figuring in this total for 648 tons. Prices have shown scarcely any change upon the German markets during the last few days.

There has been scarcely any change in the general condition of the Belgian Iron Trade. The demand has not been unsatisfactory, but prices have continued low and unremunerative. Some concessions are occasionally made from the rates nominally current. A sale of 10,080 tons of old rails is stated to have been carried through in Holland in three lots, at 2*l.* 14s. per ton, 2*l.* 16s. per ton, and 2*l.* 16s. 10d. per ton respectively. The Angleur Steelworks have discontinued working at night, and have reduced their working staff in consequence to the extent of 200 men; on the other hand, the works are now in operation six days per week in the daytime, instead of four days per week, as for some time past. The Sclessin Works are stated to have been assured employment for the winter by an order for 500 tons of bridge iron, as well as for some lots of girders. English pig has continued to be held at 2*l.* 2s. 6d. per ton upon the Belgian markets. The Athus Company, after having succeeded in overcoming foreign competition by selling at very low rates, now finds its production fully engaged, and has advanced its rates to the extent of 10d. per ton. Hard refining pig has made 1*l.* 17s. 8d. per ton, while ordinary pig has brought 1*l.* 15s. 2d. per ton, and mixed pig 1*l.* 12s per ton. As regards iron, No. 1 has continued to be quoted at 4*l.* 10s. per ton on export account, while the current rate in home transactions has been 4*l.* 12s. per ton. No. 2 has been barely maintained at 4*l.* 16s. per ton, and No. 3 at 5*l.* 2s. per ton. The exports of steel rails from Belgium in the first ten months of this year are officially returned at 51,309 tons, as compared with 59,802 tons in the corresponding period of 1883.

The Belgian Coal Trade has not shown much change, although the absence of cold weather has exerted a prejudicial influence upon the sale of household descriptions. Stocks have continued small; one colliery which had 25,000 tons on hand has seen this accumulation reduced to about 5000 or 6000 tons during the last few weeks. The general situation is not so brilliant as it might perhaps be supposed to be from this circumstance, at the same time household coal has certainly shown considerable firmness. On the other hand coal for metallurgical purposes has been greatly neglected, and the Agrappe Collieries have been obliged to reduce their production of coking coal. The number of trucks carrying coal and coke which passed over the Belgian State Railways in the week ending Dec. 7 was 15,769, as compared with 14,605 in the corresponding week of 1883, showing an increase of 1164. The imports of coal into Belgium in the first 10 months of this year were 1,005,998 tons, as compared with 1,038,917 tons in the corresponding period of 1883. Of the coal imported into Belgium in the first 10 months of this year 231,895 tons came from England. The exports of coal from Belgium in the first 10 months of this year were 3,798,260 tons, as compared with 3,585,338 tons in the corresponding period of 1883. The German coal trade has maintained about the same tone as for several weeks past. Prices have been maintained, but no advance has been established. The general exports of coal from Germany in the first nine months of this year are returned at 6,280,325 tons, as compared with 6,225,183 tons in the corresponding period of 1883.

UNITED STOCK EXCHANGE COMPANY.

Judgment in the winding-up petition against the United Stock Exchange Company was given in the Chancery Division of the High Court of Justice on Monday. The company was formed in April, 1882, for the purpose of carrying on the business of a co-operative society in all transactions relating to the sale and transfer of stocks, shares, and other property, for advancing money, and other stock-brokers' business. The petitioner was Mr. Robert Stewart Agnew, who claimed to be a creditor on a judgment debt for 879*l.* The petition was originally heard before the Long Vacation; it was opposed by certain contributories chiefly on the ground that the petitioner was not a *bona fide* creditor, and the judgment had been obtained collusively with the company in order to defeat another judgment creditor and to prevent his getting the benefit of certain furniture and effects of the company at Brighton under a writ of *elegit*. At the hearing of the petition the evidence was not satisfactory to his lordship, and he adopted the somewhat unusual course of ordering the petition to stand over to take the cross-examination of certain deponents, and also some examination in chief of certain persons mixed up with the company. Such examinations were accordingly conducted before one of the Examiners of the High Court, and the petition was reheard on the depositions so made. On Nov. 15 Mr. Mackenzie, one of the persons who opposed the winding-up, deposed that he was the original managing director of the company, and that it was formed to carry on a business he had in partnership with a Mr. Kidd, and it was formed as a limited company, because he had no confidence in Mr. Kidd; he got five other persons besides himself and Kidd to sign the Memorandum of Association, who were, in fact, dummies. It was said that the debt on which Mr. Robert Stewart Agnew petitioned was part of a sum of 1500*l.* advanced to the company by Dr. Agnew, an uncle, in order to benefit the nephew and promote his interest in the company. The only entries in the books of the company said to relate to the loan were entries in the cash-book showing money as paid by Mr. W. H. Tassie, who became managing director, and an entry in the ledger to his credit for 1500*l.* On the margin of the cash book the name of R. S. Agnew was subsequently inserted. Mr. R. S. Agnew, in his cross-examination, in effect said that he knew very little about the loan or the winding-up petition; that the affairs had been conducted for him by Mr. Tassie, in whom he had great confidence and with whom he had been in partnership. Mr. Tassie also deposed that he had negociated the loan, and that Dr. Agnew had supplied the 1500*l.*

The unsatisfactory and vague character of the evidence was commented upon by the learned Judge, who remarked that he was convinced on the perusal of it that the judgment on the debt was not obtained *bona fide* by a hostile creditor, but was obtained collusively with the company for the purpose of preventing a real hostile creditor from reaping the fruit of his judgment, and that the petition ought to be dismissed on that ground. But there were other reasons why the petition ought to fail. He was convinced from the evidence that Mr. Robert Stewart Agnew was not a creditor of the company at all. Dr. Agnew might have advanced 1500*l.* for the benefit of the company, and in some way or other to promote the interest of his nephew, the petitioner; but if any dividends of that sum were recoverable in a winding-up he was convinced that the petitioner would in no way get one farthing of those dividends. His lordship was also of opinion the petition was not in fact the petition of Mr. R. St. Agnew at all; and that he had nothing to do with the instructions for the presentation of it. In saying that he desired it to be understood that he imputed no wrong conduct to the solicitor who acted, and may very well have understood he was acting, for Mr. Agnew. There was another ground for dismissing the petition, and that was that there were no available assets of the company, and it would be causing useless expense to make such an order. His lordship then observed on "Bowe's" case in the House of Lords, in which a judgment creditor who had brought a winding-up petition refused to go behind his judgment and give evidence, and where the learned lords, reversing the decision below, had held that the proper course was not to dismiss the petition but to order it to stand over to give an opportunity for the judgment to be contested. He pointed out that this case was different, because there was no evidence in that case, and here there was evidence before him which convinced him that there was no proper debt, and the winding-up would be useless.

BRITISH AND FOREIGN LABOUR.

The Comparative Efficiency and Earnings of Labour at Home and Abroad formed the subject of a valuable and interesting paper by Mr. J. S. JEANS, secretary of the Iron and Steel Institute, read before the Statistical Society, at their meeting at the Royal School of Mines, Jermyn-street (Sir Rawson W. Rawson in the chair), on Tuesday evening. The author supplied a number of important tables, designed to show the proportions of the population of each country engaged in agricultural, industrial, commercial, and professional pursuits respectively. Taking his figures from the census reports of 1881, he computed that the 14,000,000 people belonging to the wage-earning class in the United Kingdom in that year had earned a total sum of over 580,000,000*l.*, the average being about 42*l.* per head, which was an increase of 10 per cent. on the sum computed by Mr. Leone Levi to represent the average earnings of the working classes of this country in 1867. A large number of details were given respecting the earnings of the working classes abroad in comparison with those of the United Kingdom, and the conclusion come to on an analysis of official returns as to the wages for each of the leading countries of the world was that in the United Kingdom the average wages paid were 45 per cent. under those of the United States, 42 per cent. above those of Germany, and 58 per cent. above those of France. It was also shown that between 1850 and 1883 the average earnings paid in a large number of leading industries in the United Kingdom had increased to the extent of 40 per cent., while in France during the same interval the average increase of wages was 53 per cent. in Paris and 65 per cent. in the country. In the United States within a much shorter interval—between 1860 and 1883, the increase of wages had been practically identical with that in the United Kingdom for the longer interval stated—40 per cent. A comparison was made of the proportions of wage-earning families and children relatively to the whole population in the leading industrial countries of the world, showing that women were more largely employed in Austria and France than in any other country, and that the largest number of juvenile workers was to be found in the United States. The largest population engaged in manufactures is to be found in the United Kingdom, where it numbers 23 per cent. of the whole population, against only 13 per cent. in Prussia, 12 per cent. in France, and 7½ per cent. in the United States. In almost all the leading industries of the world England occupied a position superior to that held by any other important industrial nation, both in regard to the extent of its manufactures and in regard to the individual efficiency of the workers engaged therein. Taking the cotton trade, it was shown that in the number of spindles to each operative Great Britain was 54 per cent. better than the average of the seven other leading countries of the world. The product of labour as regards the number of spindles employed was 27 per cent. better in the United Kingdom than in the United States, and as regards the working of looms our superiority was equal to fully 80 per cent. Referring to the wool and worsted trade, it was shown that the number of spindles to each worker was greater in France than in either the United Kingdom or the United States.

In reference to the mining industries, tables were given, from which it appeared that the largest individual annual output of iron ore was obtained in Luxembourg, which was followed, first, by the United Kingdom, next by France, and next by Spain; while in regard to coal the greatest average productiveness was found in the United States, which was followed next in order by the United Kingdom, Nova Scotia, and New South Wales. Statistics were also given showing that in work mainly dependent upon strength and energy English labour was considerably superior to any other country with regard to quantity, although the cost per unit of an Englishman's work was rather more than that of the labour of other countries, on account of the higher wages paid to English workmen. Statistics given with regard to wages proved that in the United States wages were higher than in Great Britain by 84 per cent., while they ranged 205 per cent. above France, and 162 per cent. above Germany. Great Britain was 42 per cent. better than Germany, and 58 per cent. better than France. In Canada, Government statistics showed the average wage paid in the building trade to be 46s. per week, being 7s. 7d. per week under the average of the Australasian colonies. The third section of the paper dealt with the increase of wages in different countries within recent years, and showed that in ten of the leading industries of the world the average increase between 1850 and 1883 was in England 40 per cent., a figure which, somewhat curiously, was almost identical with that ascertained to have been the percentage of increase in the wages of the working classes of the United States between 1860 and 1883; while in France statistics collected by the Government showed that between 1850 and 1880 the average increase of wages in 23 leading industries was 53 per cent. in Paris, and 65 per cent. in the provinces. The comparative cost of living in different countries was also dealt with at some length, the conclusion being that there were grounds for believing that it was not less tolerable in our own than in other countries for those who laboured for their daily bread.

With regard to the efficiency of labour Mr. Jeans showed that whether in cotton factories, in mineral industries, in bricklaying and earthwork, and other occupations, that English labour was considerably more efficient than that of any other country with regard to the quantity produced in a given time. The discussion which followed the reading of the paper was unusually animated, Messrs. George Howell, B. Whitworth, M.P., Cornelius Walford, H. Moncrieff Paul, Walter Pearce, George Hurst, G. B. Longstaff, F. Debenham, H. D. Pochin, R. Price-Williams, William Miller, J. B. Martin, and Prof. Leone Levi taking part. Mr. Howell said that the time lost by workmen was perforce much greater now than it was 15 or 20 years ago, owing to a greater number of holidays, and the fluctuations of trade. He was also sorry to say that the age at which men were dispensed with by employers was being pressed downwards until men with a streak of grey in their hair were refused employment. Mr. Whitworth remarked that for the last five or six years there had not been 2 per cent. made upon the capital employed in this country in the cotton trade. He did not believe that the wages of the labourer in America would buy the same amount of comforts and necessaries that the labourer could get in this country on the wages paid here. He believed that unless there was an improvement shortly wages in this country would have to be reduced, as all the losses in trade fell upon the employer, and not upon the employed. It need scarcely be said that a very cordial vote of thanks was given to Mr. Jeans for his paper.

PHŒNIX DIAMOND MINING COMPANY.—At the meeting on Monday (Mr. J. Werner in the chair) it was stated that the year had not been a very successful one for the company, which had, in common with a great many other companies, to suffer from the very low prices given for diamonds, and the very high cost of production. The question of profits seemed quite out of the question, and the directors had devoted their principal attention to consolidating the company, and keeping it out of further liabilities. In this they had been fairly successful. Their profits had not been large, but very small; but the year 1883 was not worse than the year 1882. They endeavoured last year to bring about an amalgamation of the whole of the mines In this they were not successful; but still the directors believed in amalgamation as an important element in successful working and the cutting down of prices. But although they had not succeeded in a very large and comprehensive scheme for the amalgamation of the whole of the mines for the general benefit of shareholders, and for the more economical working of the properties, they had not lost sight of the principle of amalgamation. And although they had not succeeded with the more ambitious scheme, they had turned their attention in another direction, determining, if possible, to bring about a grand federation of the mines by forming a nucleus. Consequently the Phœnix had entered into negociations with the Anglo-African Company for an amalgamation. But it was not necessary to go into that matter more fully until they had dealt with the immediate business in hand. So far as the question of the company was concerned, he was happy to say that they had several thousands to set aside, and besides that they had been enabled materially to strengthen the company. In the first place they were enabled to raise from the blue ground 40,000 loads; but according to their present report the blue had risen to 92,000 loads. This to anybody who knew anything about mines must be very satisfactory, and must augur well for the future. Latterly the directors had stopped a good deal of work, which they did not consider altogether profitable, and they did not wish to increase liabilities. Probably the liabilities of the company were now not more than 1000*l.*, and they had materially improved their status, and the position of the company now was comparatively a secure one.

WELSH COLLIERIES—AMALGAMATION DISPUTE.

The case of Jones *v.* Coedcae Coal Company, heard before Mr. Justice Kay, in the Chancery Division of the High Court of Justice, was an action to have it declared that the defendants were not carrying out an arrangement entered into between the parties at the time of the arrangement. On behalf the plaintiff the Solicitor-General said that this was an action brought by Mr. Jones, the owner of the Hafod Colliery, in the Rhondda Valley district, and the action was brought against the Coedcae Colliery Company and the Lewis Merthyr Navigation Company to have it determined that the parties were not carrying out what was the intention of both of them. As he had stated, the plaintiff was the owner of certain property called the Hafod Collieries, consisting of about 1000 or 1100 acres, and the Coedcae Colliery Company were the owners of a similar acreage in the same neighbourhood, and in the year 1881 negociations were commenced between the plaintiff and the Coedcae Company and another called the Cymmer Colliery Company, with a view to the amalgamation of the three collieries as one concern, as it was thought they could be more profitably worked as one enterprise. Accordingly negociations commenced between the three collieries, and amongst the questions which arose in the discussion of the negociations was one which had great bearing upon the action now before the Court. It was this:—That the companies, both the Coedcae and the Cymmer, and Mr. Jones held their mining properties upon leases; in no case was it a single property, but in each case there were a certain number of royalties payable under the lease to the lessor, who was owner of the fee simple, and those royalties varied in the holdings of each of the companies. Of course, when the companies were proposing to amalgamate, one of the questions to be considered was, how these royalties were to be dealt with in amalgamation, seeing that they differed in amount, even in relation to coal of the same quality. That, of course, became one of the points in the decision, and on the first occasion when there was a meeting, with reference to the proposed amalgamation, there were two modes of distribution of these royalties proposed. The scheme from the outset took this form. The new company was to pay a uniform and improved royalty upon the whole of the coal which they raised, so that the persons of the three companies who were amalgamating and transferring their property to the new company were to transfer them on the terms that the new company was to pay a uniform royalty, that being an improved royalty in respect of all the royalties; but, of course, slightly improved in the case of some, and largely improved in the case of others. The two points of distribution were, that the uniform royalty be distributed between the parties in proportion to the acreage demised to the new company, and the other in proportion to the acreage worked under the said properties. Those, of course, were two different schemes. With a view to carrying out the negociations, a meeting was held at Cardiff, on Feb. 12, 1881, and an engagement was made with the view of uniting the respective royalties, and in the first instance it was declared that the improved uniform royalty was to be 1s. per ton for large coal and 6d. per ton for small coal; but that was afterwards reduced to 10d. and 5d. No question, however, arose on that part of the case. It was decided that the uniform consolidated royalties should be distributed in proportion to the average of the coal worked. At the meeting Mr. Simons, of the firm of Simons and Plows, of Merthyr, solicitors in a large practice, attended, and acted in various matters for Mr. Lewis, who was largely interested in the Coedcae Company, and in these negociations he (the Solicitor-General) thought it was clear that Mr. Simons was acting, down to a certain period, for both parties, both for the Coedcae Colliery Company and Mr. Thomas Jones. Mr. Simons' statement was that he acted for both, and never acted for Mr. Jones apart from the Coedcae Company, and he would explain presently how it was that another firm of solicitors came to be called in.

At the meeting on Feb. 12, Mr. Simons was directed to prepare a draft contract to carry out the terms agreed upon. On Feb. 22 a meeting was held in London, and at that meeting the Cymmer Company withdrew from the agreement; but, nevertheless, Mr. Lewis, as representing the Coedcae Company, was anxious it should be gone on with between the Coedcae Company and Mr. Jones, and the same day an interview took place at the Inns of Court Hotel between Mr. Lewis, as agent for the Coedcae Company, and Mr. Simons, who presented the draft he had prepared, which was read over by the plaintiff and Mr. Lewis, certain alterations being made, one of the alterations by Mr. Lewis being that the consolidated royalties were to be distributed in proportion to the acreage worked instead of the acreage itself. At the same meeting an agreement was signed by Mr. Lewis and Mr. Jones to carry out the amalgamation on those terms, the consolidated collieries to be held by the company, subject to the payment to the owners, half-yearly, of a uniform royalty of 10d. for large and 5d. per ton for small coal, the royalties payable by the owners to their lessers to be deducted out of the proportionate part of the consolidated royalties. On March 31 an agreement was come to supplemental to that one. On April 19 a meeting took place, at which Mr. Williams, Chairman of the Coedcae Company, presided and at that meeting the draft agreement was altered, making the royalties payable by the company instead of the owners, and Mr. Simons added a provision to meet the altered circumstances, and used these words:—"A charge against the parties entitled to receive the consolidated royalties according to their respective interests therein." The object of that was to provide that the payment should be made in any event by the new company. The question of rectification would be brought out in what passed at the meeting. Mr. Simons would tell his lordship that the only matter discussed and arranged was the desire of the Coedcae Company to have the alteration made that they might pay the royalties in the first instance. But a most vital alteration was made in Mr. Jones's position. The royalties he paid in the Hafod were but 5d., and the average royalties of the Coedcae Company were about 9d. The draft contract was taken away by Mr. Simons to be printed, but an important alteration written upon the back was never inserted. They had seen the draft agreement which contained the words "interest therein," made by Mr. Inskip on behalf of Mr. Jones, but they were admitted in the agreement itself. In the draft it appeared in this form—"The rents and royalties to be paid by the consolidated company, and charged against the respective shares of the said Coedcae Company and Thomas Jones, according to their respective"—and there it stopped, the words "interest therein" being left out. The two questions he raised in the present instance were these:—First, upon the true construction of the clauses of the agreement, were the royalties payable by Mr. Jones or by the Coedcae Company, to be charged against their respective shares in the consolidated royalties? or were the paymen's

to be made in hotch-potch, so to speak, or the balance, after making those payments, to be divided in a lump sum. If the former was the true construction, then Mr. Jones had what he alleged was the agreement into which he entered. If the latter, then they said it did not carry out that which was the intention of the parties, which was agreed upon on April 19. That really was the whole of the case. It would depend first of all upon the construction of the contract as it stood, and next whether if the evidence he should call, and the evidence upon the other side did not carry out that, whether it ought to be rectified.

On behalf of the company, Mr. Graham Hastings, Q.C., said he should like to know if the Solicitor-General asked the Court to make the amendment?—At this stage the Court adjourned to enable the parties to consult, and upon the Court resuming, Mr. Kekewich said he had had a short consultation with the Solicitor-General, and he had his concurrence in asking for leave to amend.—Mr. Graham Hastings objected to leave being granted to amend.—Mr. Justice Kay: You had better have it done in this way, that the amendment be put in a very definite form.—Mr. Graham Hastings thought that would be the better way. What he wanted to know was by whom the alleged misrepresentation was made, and when and where?—Mr. Justice Kay: You want all particulars of the alleged misrepresentations?—Mr. Graham Hastings: Yes.—Mr. Kekewich: Will your lordship give me reasonable time?—Mr. Justice Kay: I think you should be limited to time as for these particulars, and I also think you should pay the costs of the summons now; in fact, I order you to pay the costs of the summons.—Mr. Graham Hastings: I submit we ought to have the costs of the day as well as the costs of the summons.—Mr. Kerkewich: My friend comes here to oppose any amendment being allowed whatever.—Mr. Justice Kay: He says that if you give me particulars, and if the Court allows the amendment, the whole thing may be tried. Surely it was incumbent on your client to come to the Court as well prepared as possible.—Mr. Kekewich: If we had known we could amend we should have come prepared. I am quite prepared to pay the costs of the summons.—Mr. Justice Kay: I give you leave to amend, and I make an order that you give particulars of the alleged misrepresentation within three weeks, and I also call upon you to pay the costs of the summons and the costs of the day.

ENGLISH MACHINERY, AND SPANISH PURCHASERS.—The case of NEVILLE *v.* MACKEAN, heard in the Queen's Bench Division of the High Court of Justice, was an action for libel, and was undefended. Mr. Murphy, Q.C., Mr. Abrahams, and Mr. Wentworth Grant appeared for the plaintiff.—Mr. Murphy, in opening the case to the jury, described it as one of an extraordinary character, and as showing peculiar baseness on the part of the defendant, for the libels in question were not only most violent in themselves, but there was evidence that the defendant, who to his need had been greatly befriended by the plaintiff, had turned round and conspired with others to circulate the libels with the object of injuring the plaintiff's credit and reputation in Spain. The plaintiff was a German by birth, his name being Goldstein, but he had become naturalised in this country, and had lawfully assumed the name of Neville. About 1876 he was appointed agent for an English firm to sell implements and tools of their manufacture in Spain, and being allowed by the terms of his agreement to enter into other engagements on his own account, his business so improved that he was induced to take the defendant into partnership. This step was taken at defendant's own request, as he should be able to show by a letter written by the defendant at the time, in which he sets out that he was in great pecuniary embarrassment, and made an appeal to the plaintiff to assist him. The partnership continued until 1881, when the plaintiff, being unable to obtain from the defendant a proper statement of accounts, took proceedings in Chancery for a dissolution of partnership, and obtained a decree against the defendant for something like 3000*l*. Subsequent to this the plaintiff went again to Spain and was surprised to find that his customers fought shy of him, and that he could get no orders. This led him to make enquiries, and in 1883 he discovered circumstances which led to the present action. One of these was a letter addressed by the defendant in March, 1881, to one Sunyi, a discharged clerk of the plaintiff's; and another was a letter of a later date addressed by the defendant to a Spaniard of the name of Velasquez. There were several other letters by the defendant, couched in a similar strain, but it would be sufficent for present purposes to read these two before the jury, both of which had been admitted by the defendant. The first was as follows:—"This is certainly a piece of audacity to send circulars so near where he (the plaintiff) deliberately swindled his creditors. A thorough good flogging is what he deserves. Can you not get some of your friends to communicate with Turton and his German houses in order to put them in the way of knowing their man a little better." The second letter was of much greater length, but it contained statements quite as derogatory, and immediately upon the plaintiff becoming acquainted with it, he commenced the present proceedings. Further enquiries brought additional letters to light, and showed that the defendant had been promoting their circulation before the decree was given dissolving the partnership. The defendant had pleaded to the action justifying some of the libels, but to an amended statement of claim, setting out a charge of conspiracy, he had made no answer whatever, and he did not choose to put in an appearance to-day to substantiate those letters which he had alleged to be true, and there was reason to believe that he had left the country and was at this moment in Spain.—Mr. Murphy concluded by asking the jury to give his client substantial damages, not so much for the sake of his pocket, as because nothing less would suffice to restore his credit and silence his traducers in Spain.—The plaintiff was then called, and having given evidence in accordance with the above statement, the letters in question were put in. The one written to Velasquez purported to give an account of the plaintiff's life, and accused him of having commited larceny. The defendant further wrote that he had been induced by the plaintiff to become his agent and had consented, hoping the plaintiff intended to lead a reformed life, but his trump cards had been deceit and falsehood, and he had been described to the defendant as being the greatest swindler in Europe. He (the defendant) was anxious not to be mixed up with so dirty a fellow, and it was simply an insult to the manufacturers of Spain that he should be allowed to busy himself with the sale of machines of which he had not the slightest knowledge. This being the plaintiff's case, the learned Judge (Mr. Justice Field) briefly summed up, and the jury found a verdict for the plaintiff with 1000*l*. damages. Judgment was given accordingly.

ARCHÆOLOGICAL FRAUDS.—Mr. Clermont-Ganneau, the accomplished Orientalist, has, says the Times, in the press (Ernest Leroux, Paris), an admirably bound and printed little book, entitled "Les Fraudes Archéologiques en Palestine." After a brief account of the seven genuine inscriptions, six of which were brought to light by himself, Mr. Clermont-Ganneau relates, for the first time, the full history of the Moabite pottery, followed up by that of the Shapira manuscript, and other frauds, to which the rarity and consequent value of genuine relics in Palestine have of late years given rise. The author's keen sense of humour, coupled with his personal knowledge of the facts, renders his book entertaining for the outside world, while it will do good service in putting archæologists on their guard against imposture. It is consoling to find that Mr. Clermont-Ganneau, whose acuteness was so signally shown in the prompt detection of the Shapira fraud, points out only one sham antique in the British Museum—the Phœnician inscription on a small bronze figure, itself genuine.

HOLLOWAY'S PILLS.—The sudden changes, frequent fogs, and pervading dampness, sorely impede the vital functions and conduce to ill-health. The remedy for these diseases lies in some purifying medicine, like these pills, which is competent to grapple with the mischief at its source, and stamp it out without fretting the nerves or weakening the system. Holloway's pills extract from the blood all noxious matters, regulate the action of every disordered organ, stimulate the liver and kidneys, and relax the bowels. In curing chest complaints these pills are remarkably effective, especially when aided by friction of the ointment on its walls. This double treatment will ensure a certain, steady, and beneficent progress, and sound health will soon be re-established.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—No. III.

A NEW METHOD OF CONSTRUCTING A HORIZONTAL TUBULAR BOILER was explained in a paper by Mr. F. A. SCHEFFLER, of Erie, Pennsylvania, who observed that since the early history of steam-boilers, science, in its progress towards a more efficient and at the same time a more simply constructed boiler, has been constantly nearing the perfection looked and hoped for by the many changes for the better that have been made in the rolling of boiler plates of either iron or steel. It is true that improvements have been made more rapidly in the manufacure of steel-plates for boilers than in iron-plates, due chiefly to the fact that the steel-plates have no grain to be considered in rolling them either lengthways or cross-ways for their use in boilers, whereas with iron the peculiarity of its fibrous structure is an objection to the manufacture of large plates.

Were it not for the superiority (as the writer firmly believes) of steel over iron for use in boilers of all sizes, and the fact that plates from the smallest dimensions to the enormous size of 16 ft. long, and 100 in. wide can be obtained, there could be no possibility of a paper at this time on the subject.

When steel can be obtained for use in boilers having a guaranteed tensile strength of 60,000 lbs. per square inch, an elastic limit of 30,000 lbs., an elongation of 20 per cent. in an 8-in. specimen, and a reduction of area of from 45 to 50 per cent., and which will also bend down close when cold, without fracture, it is very apparent that the superiority of steel over iron cannot be questioned. Another favourable point is that this quality of steel is homogenous, and it will not blister.

The fact that these large plates of steel can be obtained caused this question to arise in the mind of the president of the works where the writer is employed—Why not construct boilers of steel in two plates only? The advantages are numerous, and of the best kind.

It is well known that attempts have been made, and these attempts have sometimes been successful, to make a boiler of the style in question with a single plate on the bottom, by hammering and swaging into shape. No reliance can be placed on boilers made by this method, as the iron (when iron is used) loses its toughness and good qualities by being subjected to such a large amount of hammering as must be done to form such a construction. Mr. D. K. Clark refers to some tests that he made on welded iron plates, and, although some of the tests were very satisfactory, yet the danger lest it be not known positively whether the weld would be a substantial one or not causes a reluctance in recommending boilers with welded plates. This method is also very costly, and with the uncertainty and cost combined taken into consideration, this method has been abandoned.

By making a boiler entirely of two plates only (except, of course, the flue'sheets), the following advantages are apparent:—

1.—By carrying the longitudinal seams above the water line (say 2 in. above the top of the flues) and closing up the brick setting at that height, there will be no seam exposed to the fire other than the lower half of the back head. This is a positive advantage over boilers as commonly constructed, when there are from four to eight seams exposed to the fire.

2.—But thus eliminating the exposure of the seams, a greater reduction is apparent of the chances for a leakage around the rivets.

3.—The advantage of equal expansion and contraction is so great as also to be of great benefit, and the usual excessive strains are largely reduced.

4.—For cleaning the boiler, no question can be raised as to the benefit of a single plate on the bottom. There are no rivets for lodgment of scale, sediment, &c., and there are no seams to interfere with a thorough scraping of the shell.

5.—There being no seams vertically, the boiler must be stronger, as there are no holes punched for rivets.

The latter fact is the one that will give rise to the most serious discussions of this paper. It may be questioned whether one large plate extending the whole length of a boiler will be as strong as the same plate cut into two or three pieces and then single rivetted together. Mr. Scheffler holds that the former is the stronger of the two, and that, if the boiler is properly supported, as all boilers should be, there will not be any trouble with the boiler springing or the plates warping.

A set of hollow rolls 16 ft. 4 in. long, in the clear, and each roll 14 in. diameter and 2⅞ in. thick, was designed some time last spring by the former superintendent. When the writer took charge, it was proposed pushing the matter forward as soon as possible, and patterns were made immediately and then put in the hands of the moulders. The castings were soon under way, and by Sept. 1 the rolls were ready for the first experiment. They were geared to run by belting from the main line running 120 revolutions per minute, and the speed reduced to three revolutions per minute on the rolls. Eight-inch single belting was used. The first sheet experimented with was for a 36 in. by 10 ft. boiler, and the plate was 62 in. wide and 10 ft. long, by 7-32 in. thick of steel. The rolls worked somewhat hard at first, being new, and they were allowed to run two days to stretch the belting as much as possible. The stretch was then taken up and the plate entered into the rolls. This plate went through in good shape, and so did the top plate—the latter rolling up easier than the bottom plate, because the sheet had been punched for the dome and a hole cut for the man-hole. A larger plate was tried next—a plate 12 ft. long, 9-32 in. thick—when it was found that the gearing was insufficient for the work. An alteration was then made, new gears being substituted, by which the power was largely increased, and 10 in. belts were used. The 12 ft. plate was then rolled. The amount of power required to roll this immense sheet of steel was entirely beyond expectation. When a 12 ft. plate 5-16 in. thick was attempted, it was rolled entirely by coaxing, as the belts would slip, although the pulleys were quite large in diameter and as wide as convenience would permit. The pressure exerted on each roll at its circumference, or at the pitch line of the gears on the rolls (the latter being the same diameter as the gears), is estimated to have been 15,000 lbs., and was supposed to have been sufficient to roll a plate of any size that the rolls would take in. The idea of belting was at once abandoned, and an engine was specially constructed to gear directly.

On Sept. 23, 1884, the first 60 in. boiler, 16 ft. long, 3-8 in. thick of steel, was constructed in two plates. This is the first boiler of this description ever made in this country, and, as far as the writer has knowledge, in any other country. It is found that a greater degree of accuracy can be maintained in getting the rivet-holes in direct line, and thereby the likelihood is greatly reduced that the boiler-makers will have the chance to use the detestable drift-pin, that greatest of all evils in boiler construction.

Some members may have their objections to the use of steel for boilers, and claim that it is so recent in the market that the method of handling it in manufacturing establishments is not yet sufficiently well developed to be relied upon. The writer heard of a gentleman a short time ago who objected to the use of steel for boilers for the above reason. The manufacturers who make a speciality of using this material of course have the advantage over those who use it only on occasional orders; but he does not hesitate to say that, since this material has been in use for upwards of eight years, there has been every opportunity that could be desired for all interested to avail themselves of the proper knowledge of the handling of it.

If locomotive boilers constructed of steel should be made with only one course in two plates, from the throat-sheet to the smoke-box there would undoubtedly be a great reduction of the liability to leakage and wear and tear, and probably a longer life of the boiler would be secured, although the fire-box is generally the first place to need repairs. It is the writer's belief that this new construction of horizontal tubular boilers will be the method of the future for this type, and he hopes that the few points brought forth in this paper will be of service in stimulating discussion and further progress in this direction.

In the discussion which followed the reading of the paper Mr. Stirling expressed his satisfaction at any advance in the construction of horizontal tubular boilers, inasmuch as he believed them to be possessed of certain advantages that would ensure their use for a long time to come. The main point was the large water surface, which appealed so strongly to the fireman, since the water level is the main thing he has to take care of. He considered the lack of amount of water level one of the principal defects in water-tube boilers. While conceding the objection that the large shell of the tubular boiler did not admit of the highest steam pressures he maintained that as a fact water-tube boilers are not used largely for power purposes, and not at all on steamships. Mr. Stratton pointed out that three of the vessels in the French navy, one of them for over six years, had had water-tube boilers in successful use. The Voltigeur, one of these steamers, carried 150 lbs. of steam. He asserted that any difficulty due to less water surface in tubular boilers was overcome by the use of mechanical separators; the tubular boiler weighed 65 lbs. per foot of heating surface, while the water-tube weighed only 40 lbs. In answer to Mr. Stirling's question—how it was that the water-tube boilers had failed in the Guion Steamship Line Montana, notwithstanding that a large sum had been spent in the matter? Mr. Stratton said that the circulation in these special boilers of the Howard type had been bad. Mr. Emery insisted on the necessity of securing high-grade steel for boiler shells, as it was only this that was not injured in the process of making the boiler. He thought this caution specially meet at this time, when so much steel rejected for the United States naval cruisers, on account of the high standard demanded for these cruisers, was now floating around in the market. Mr. Kent thought it a settled fact that less risk was incurred by the use of steel than by the use of iron for boiler purposes. Mr. Wellman disputed the novelty of Mr. Scheffler's construction, since boilers with one sheet at the bottom had been in use in Cleveland for at least eight years. Mr. Davies believed that a self-contained boiler was the best form. He found that the brickwork cost more than the boilers to set up and keep in repair. In his practice he had never found the seams to give out but the sheets annexed to them. A new boiler, only six months in use, that blew up owing to excessive pressure, coming under his observation recently, had the sheets destroyed but the rivets intact. Mr. Barnes considered rivetted seams made an amply good and strong job. A rivetted seam can be relied upon as a certain thing, while a welded seam necessarily involves uncertainty. Mr. Davis endorsed the idea of rivetting, on account of the possibility by proper inspection of being sure of the job. Prof. Denton cited the practice of the Pintsch Lighting Company, which imports tanks of 36-in. diameter welded up (not rivetted), which tanks withstand a working pressure of 200 lbs. These tanks, adding import duty, are apparently cheaper than suitable tanks procured in this country.

SOUND CASTINGS were treated of in a paper by Mr. THOS. D. WEST, in which he dwelt upon the difficulties and the methods by which they are overcome in a few typical cases, which he illustrated.

In the discussion following this paper a number of hypothetical questions were put to Mr. West, which threw some doubt on the exact value of his propositions, which hypothetical questions he was unable to answer satisfactorily, it was none the less commented upon with gratification that there are foundrymen who are trying to make not only what will sell, but what is really good.

MEASUREMENTS OF FRICTION formed the subject of a paper by Mr. C. WOODBURY, of Boston, and the SLIDING FRICTION OF ROTATION was explained by Prof. R. H. THURSTON, in a summary of a paper on that subject. Both were discussed together by Messrs. Towne, Schumer, Holloway, Kent, Odell, and Emery; Dr. Arvin, chemist of the Standard Oil Company, a guest, speaking by invitation at length on the experiments made under his supervision on the applicability of different mineral lubricants to a variety of purposes.

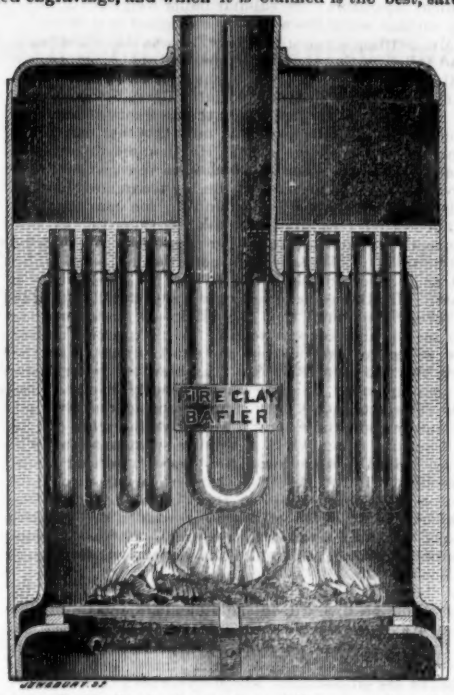
PRESENT DEPRESSION AND FUTURE PROSPERITY.—Some suggestive observations, many of which are quite as worthy of consideration upon this side of the Atlantic as upon the other, have been published under the heading of Cease the Cry of Hard Times in the American Coal Trade Journal which says:—Let us have done with the constant cry of hard times. Will business be any better for our complainings? Can confidence, the mainspring of business prosperity, be restored when we are continually bemoaning the unsatisfactory condition of affairs? If we stop for a moment to consider the condition of the country we can readily see that we are in possession of all the needed facilities for carrying forward a most successful business. Money is abundant, and can be obtained at a low rate of interest. Our mines of precious metals are still rich and are producing satisfactorily. We have plenty of raw materials of every description. Our manufacturing plants are sufficient to supply the requirements of very extensive home and export trade. Our farmers have been favoured with an exceptionally large crop. Our carrying facilities, both by rail and by water, were never better, and the charges for transportation are very low. We are at peace with all the world. National taxes are being rapidly reduced, and local taxes are not oppressive. The majority of our traders and manufacturers are solvent, the weak and rotten concerns being pretty well weeded out. The supply of materials in the hands of manufacturers and middlemen are not over-abundant, if we except one or two classes of manufactures which seem, in view of the restricted trade of the present, to be in excess of our requirements. What, then, is needed to give a revivifying influence to business? It is not capital, for that is abundant. It is not facilities, for we have all needed means for carrying on a most extensive foreign and domestic traffic. It is not lack of need of productions, for the wants of our fifty odd millions of people are daily multiplying. We want confidence. Our hope needs reviving. Our ambition requires stimulating. The money of the country should flow out of the coffers of the grasping money-lenders into the free channels of trade and commerce, where all will be benefited. We need to build more houses. Our railway system is far from being completed. We should go abroad and seek for more trade in foreign lands. We should at once proceed to establish steamship lines to scores of foreign ports that now are not reached by direct communication with this country. We should stretch forth a welcoming hand to our South American brethren and invite them to engage in closer commercial relations with us. If we do not like the political aspect we should not therefore fold our hands and invite inevitable ruin by supineness. Rather let us gird ourselves more strongly for the fight and push manfully forward. The disadvantages which we have to overcome will serve to inspire us for the contest, and, once getting our line in motion, all obstacles will be swept from our path. A great future is before our people. It is only a question of time when our prosperity will equal our most sanguine hopes. He who looks forward to perpetual hard times is a pessimist of the worst type. We have at hand too many elements of success to encounter defeat for ever. This country abounds in too great riches to continue long in a state of poverty. We hope that the constant talk of hard times will give place to a more confident belief in the near approach of general prosperity, and to a hopeful and rational view of the situation.

NEW ELECTRIC BATTERIES.—A novel thermo-chemical battery has been invented by Mr. VINCENT RIATTI, professor of the Polytechnic School at Torli, Italy. The production of the currents results from the difference of temperature of two layers or strata lying at different levels in a vessel filled with liquid. The cell consists of a wooden box or vessel, traversed by two copper pipes, placed the one over the other, and separated by a distance equal to about half the height of the vessel, which is filled with a solution of sulphate of copper. A current of steam passes through the upper tube, and a current of cold water in the lower, with the effect that copper is deposited on the latter, while the substance of the former is reduced. By changing, from time to time, the position of the tubes, equilibrium is established. This battery is said to work well, and not to polarise, but up to the present no practical information as to its performance has been published, and, consequently, we cannot do more than call attention to the principle of its action.

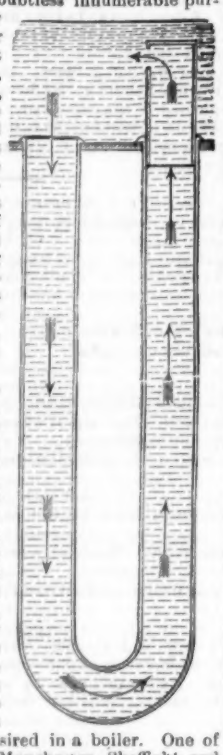
MINERALOGICAL SOCIETY.—The meeting of members was held at the Museum, Jermyn-street, on Dec. 9 (Rev. Prof. Bonney, D.Sc., F.R.S., in the chair), when Mr. Frank Johnson, Associate, was elected a member, and the papers read were by Prof. Heddle, F.R.S.E., "On the Geognosy and Mineralogy of Scotland (Ross and Cromarty)," Part I. The Islands; and by Mr. Ernest Ady, "On Observations on the Preparation of Mineral and Rock Specimens for the Microscope."

SAFETY WATER TUBE BOILER.

The importance of ample heating surface and thorough water circulation for insuring economy in the generation of steam has been satisfactorily demonstrated by practical experience, so that the principal question is with regard to the best method of securing these conditions, and this seems to have been very ingeniously solved by Mr. JAMES BOULTON, of Ashton-under-Lyne, who has been largely introducing the patent safety boiler represented in the annexed engravings, and which it is claimed is the best, safest, and



most economical boiler in the market, whilst possessing the farther advantages of occupying less room per horse power, and being lower in price than other boilers. There are doubtless innumerable purposes connected with mining, especially colonial and foreign, where such a boiler would be indeed a great boon, since it could readily be transported in pieces, none of which need exceed a mule-load, could be quickly put together and got to work, and would place the user in as good a position for obtaining an abundant supply of steam as if he were in a home manufacturing district. From the character of the boiler it will be obvious that the tubes, which are the only portions of the boiler at all liable to hard wear, could be readily replaced, the cost of keeping a few extra tubes, which are interchangeable, on hand, being quite trifling. It is scarcely necessary to state that the engravings represent a section of the boiler, and a section of one of the tubes upon a larger scale.



It will be seen that it is a water tube boiler upon an entirely new principle. The tubes are of U form; both ends terminate on the tube-plate; they are drifted in the usual way, and in one end is inserted a shorter tube with a blank end, but has an opening at the side to prevent priming; and as steam is generated in the tube it ascends, the longer tube offering the least resistance, whilst the shorter tube supplies water. Mr. Boulton has made several of these boilers, has several in hand 4 ft. diameter for 120 lbs. pressure, and is preparing a boiler 7 ft. diameter by 16 ft. high for manufacturers, to prove that this class of boiler is superior to the horizontal type, and more economical in price, fuel, and fixing, as it requires no brickwork. It will not be disputed that the free circulation is all that can be desired in a boiler. One of these boilers has been supplied to the Manchester, Sheffield, and Lincolnshire Railway Company, Manchester, for pumping purposes, and several are in use in steam launches; one boiler is 2 ft. 4 in. diameter by 3 ft. high, has 27 ft. of heating surface, and works an engine 5 in. diameter by 6 in. stroke, and 250 revolutions per minute. The boiler is fed with cold water, the blast is *nil*, the orifice being full bore of the pipe, 1¼ in., and this boiler maintains 60 lbs. pressure with ease on small coal, and the manufacturer believes that there is not another boiler in existence doing the same work, and the results recorded by some of the large locomotive builders against other water tube boilers certainly seem to justify the claim that this has proved far superior in evaporating power per lb. of coal. He made one for land purposes, 2 ft. 6 in. by 4 ft. 6 in., with 50 square feet of heating surface. From a test of a model to scale the arrangement appears to be excellent, and Mr. Boulton has a large tube set up at his works, 2 in. by 3 ft., which gives the same result. He has, moreover, just put in hand to order a vertical boiler for a ships furnace, 2 ft. diameter by 3 ft. high, with 32 square ft. of heating surface.

PROTECTION AND FREE TRADE.

The thorough impracticability of reintroducing Protection even could it be demonstrated to be desirable to do so, has been more than once pointed out in the *Mining Journal*, and every statesman who addresses a public meeting seems to confirm this view. At the meeting last week of an agricultural society at Louth, Mr. James Lowther, M.P., referring to agricultural depression, said it was a question now admitted on all hands not to be within the range of party politics, but one which concerned all Her Majesty's subjects engaged in agricultural pursuits. At a meeting of the Central Chamber of Agriculture, which was composed of men of both political parties, the subject under discussion was a proposed enquiry into the causes of the depression in trade and business other than agriculture, with a view of showing how far these causes were affecting the agricultural depression. In the course of the discussion he found that several of those who agreed with him in the general political affairs of the country took a line entirely opposed to that which he felt compelled to take; while, on the other hand, some of those who upon general political questions saw matters from a different standpoint to himself, he found ranged on that occasion on the same side as himself, and this went to show that the question they were dealing with was outside the purview of party politics. Whether a protective tariff might be a good thing for the farmers or a good thing for the masses of the people, he had no hesitation in saying that any remedy which proposed to benefit the owners and occupiers of land at the expense of the great masses of the community would be one which he should stigmatise at the outset as wholly impracticable. It was only right that as practical men they should consider in what relation the great masses stood to a question of this kind. To begin with, the agricultural labourer in whom so much interest had in many quarters been recently expressed, now found himself standing a very good chance of being improved off the face of the earth. He found that agriculture, whence he derived his means of subsistence, was being rapidly stamped out of the list of the industries of this country. When he found that acre after acre of land—amounting to millions of acres—was going out of arable cultivation and some out of all cultivation whatever, the agricultural labourer did not require them to tell him that he was a very serious loser by such a state of affairs. The agricultural labourer might be told to never mind whether he got employment or not; never mind whether his weekly wages were reduced from 18s. to 12s. or 10s., or even to none at all, because, notwithstanding this, he had the great and inestimable boon of a cheap loaf, albeit he was without the means of acquiring that loaf. Suppose, for the sake of argument, that a duty of 5s. or 6s. per quarter upon imported wheat would augment the price of bread to each head of the population about ½d. per week—and they had it upon the authority of Lord John Russell that two-thirds of the duty on imported cereals would be borne by the foreigner—taking the case of a man with a large family, it was a matter of an increase of a certain number of farthings or halfpennies per week. A working man who found his wages pulled down from 18s. to 12s. was not disposed to be grateful for the ½d. saved in his loaf, because he might say he was getting 5s. 11½d. the worst of the bargain. Those engaged in agricultural work were in the same boat. If landlords' rents came down, occupiers' profits vanished and labourers' wages were reduced. They were also interested in this question. It was not enough for them to appeal merely to those engaged in agricultural pursuits.

It would be futile to appeal to the large majority of the people of this country to assume burdens and incur obligations solely for the benefit of the agricultural interest. It was necessary that they should show that those engaged in trades and business other than agriculture, whether they were manufacturers, shopkeepers, or artizans, were, like themselves, interested in restoring prosperity to agriculture. If they went to those engaged in retail trade in towns, they would be told that the fact of the agricultural interest being so depressed was the cause of their having fewer customers. That might be because the landlords' rents had fallen or the land occupiers' profis had diminished or vanished altogether, or the labourers' wages were reduced or had disappeared altogether; but they were told the same story everywhere, that business had been seriously, if not vitally, affected by the depression in agriculture. There could be no greater mistake than to suppose that the agricultural interest were asking the people of this country to undertake an enormous task for the benefit solely of agricultare. He argued that every man, woman, and child who was called upon to devote a farthing per week towards regaining agricultural prosperity, would not be doing so for those engaged in agriculture only, but for the benefit of themselves at the same time. The labouring classes had not yet fully realised the fact that low wages, or the absence of wages—as was already the case in too many instances—were the practical result of the low prices obtained for the various articles of commerce. He was talking to practical men, and he would suggest that all of them should frankly and freely express to those whom they employed, or would employ, that the reason they had been compelled to reduce their wages, and in many cases the number of hands, was because the profits obtainable in business had been so immeasurably reduced. At the same time it would enable them to tide over the period of difficulty and depression without in any way disturbing those mutual relations which prevailed between employers and employed in agriculturul districts. He would like to say that while the national mind was getting acclimatised to the absolute failure of our present fiscal system, they ought to have one instalment of justice—that so long as the nation was determined that what was called the food of the people should be exempt from all taxation, whether that principle was good or bad it should be adopted all round. If foreign food was not to be taxed home grown food should be equally exempt from taxation. He could not see how it could be contended that rates and taxes should be levied upon land which was solely devoted to the purpose of producing the food of the people at home, while the food produced abroad coming into competition with the home industry was admitted free If the imported food of the people was not to be taxed at all it must be exempt from taxation all round, and they were justified in demanding a full, complete, and searching inquiry into this subject. If it was found that they were wrong let their errors be proved, but if their views were correct it would not be a moment too soon to have a reversal of that fiscal system which at the present time was producing most disastrous results.

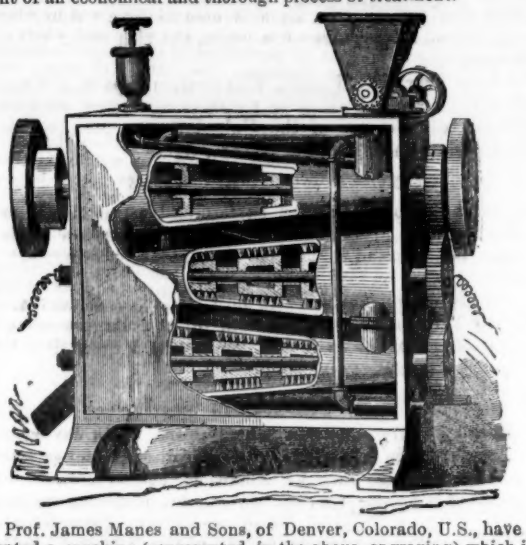
Now, all Mr. Lowther's arguments and statements of facts will appear to the impartial reader to prove the fallacy of Protection. For example, he says that "a working man who found his wages pulled down from 18s. to 12s. was not disposed to be grateful for the ½d. saved on his loaf, because he might say that he was getting 5s. 11½d. the worst of the bargain." The argument here would not be so absurd if the statements were facts, but Mr. Lowther must surely know that comparing the amount which the working man received for each hour's work in the days of Protection was scarcely 60 per cent. of that which he receives to-day, notwithstanding the fact that we are suffering from one of the longest and most severe periods of commercial depression through which the country has ever passed; and Mr. Lowther must also know that the working man can now purchase for 10s., or less, what previous to the introduction of Free Trade would have cost him at least 1*l.*, and that these facts apply to workmen of every class without exception, and to every commodity, unless indeed rent be included as a commodity, in which case Mr. Lowther may truly say that not only has there been no reduction, but that landlords have constantly become more rapacious and exacting. The disastrous results about which Mr. Lowther talks are not due to Free Trade, but to the increased exactions of landlords, and if a Parliamentary enquiry would ensure the enactment of a law that the valuations of 1835 should be reverted to (though in common justice to the community the landlord should be compelled to submit to the same reduction per cent. as has taken place in the price of other saleable commodities) the present depression would at once disappear, as we should be able to slightly lower workmen's wages without injuring the workman, and thus at once regain the foreign markets which we have now lost, or are fast losing. The discussion of the profits of landlordism and commercial enterprise simultaneously, as Mr. Lowther discusses it, can but facilitate the demonstration of suffering which the extortion of landlords inflicts upon the working classes and upon the country generally.

GREAT WESTERN ELECTRIC LIGHT AND POWER COMPANY.—An extraordinary general meeting was held at the City Terminus Hotel, on Monday, to consider resolutions approving a conditional agreement made between the company and the Anglo-American Electric Light Corporation winding-up the company, and appointing Mr. E. Garcke, and Mr. F. W. Reynolds, liquidators. The chair was occupied by Mr. J. B. Braithwaite, jun. The solicitor, Mr. Crisp, read the substance of the agreement, the fifth clause of which stated that the liquidators should pay out of the cash of the company a sum equal to 10s. per share, to be applied in paying a dividend of 10s. a share to the shareholders. In addition each member of the company would be entitled any time within three calender months to require the Brush Company to allot him three fully paid-up 5*l.* shares for every 20 fully-paid shares in the company. The Chairman trusted that the terms of the proposed amalgamation would be quite clear and satisfactory to them. He, having explained the origin of the proposals, stated that having regard to the present market value of the Brush shares the shareholders would thus receive 1*l.* 0s. 6d. per share, which was more than the company could give them supposing it went into liquidation. Mr. Reynolds said it should be borne in mind that while the capital of the Brush Company had been reduced to one-half of its original amount, the capital of their company remained the same, and, therefore, every 5*l.* share in the existing Brush Company was equal to 10*l.* of their stock, as it was when the company was started. Mr. Backhouse opposed the agreement, and considered it monstrous that the Brush Company should participate in respect of the shares held by them in this company in the cash distributed. Ultimately the resolutions were adopted by a large majority.

NOVEL ELECTRO METALLURGICAL MACHINE.

PROFESSOR JAMES MANES AND SONS call the attention of miners, mineowners, capitalists, and others interested in the working of gold or silver mines to their new Electro Metallurgical Machine for extracting fine and rusty gold from sands or tailings of stamp mills, or the sands of hydraulic gold diggings, or from the black sands on the coast of Oregon or California, and other parts of the world where gold is found.

The problem that has long troubled the worker of free-milling gold and silver ores is a method to save the mineral now lost in the tailings of stamp mills or flumes. This alone, if it could be saved, would amount to many million dollars profit each year, besides enabling the working of much territory which is now lying idle for want of an economical and thorough process of treatment.



Prof. James Manes and Sons, of Denver, Colorado, U.S., have invented a machine (represented in the above engraving) which it is claimed will save nearly the entire amount of mineral which passes through it, the loss not being over 10 per cent., and in many cases not in excess of half that amount. The machine is a cheap and practical process—it never need stop for charging or cleaning up, being nearly self-acting. Steam, electricity, and mercury are used in the process of extracting the mineral.

This machine or amalgamator is adapted for free-milling gold or silver ores, or refractory after roasting. It consists of a series of three or more large cylinders, wider at one end than the other, placed one above the other in a horizontal position, a shaft or spindle running through the centre of each.

The ore and mercury are fed into the first cylinder, passing into the second, and then to the third. The first cylinder is furnished with steel mullers which nearly touch the sides of the cylinder, and revolve at a good rate of speed, mixing the mercury and ore. The second cylinder is furnished with large steel brushes attached to the shaft or spindle, revolving at a high rate of speed; through this a current of electricity is furnished by a Westinghouse dynamic electro machine, which materially assists in gathering the particles of very fine gold together, and thoroughly amalgamating the metal and mercury. The third cylinder is similarly furnished to the second; into this the amalgam passes, and is again acted upon and mixed by the brushes to catch any gold which might have escaped amalgamation in the second. A fourth cylinder may be used if found necessary.

The amalgamated pulp then passes through a revolving copper drum, plated with quicksilver inside. As the drum revolves it takes up the most part of the amalgamated gold. As the inside of the drum is constantly washed with a spray of water from perforated pipes fixed inside of said drum, a clean-plated surface is constantly brought in contact with the pulp or tailings as it passes out from the cylinders. After leaving the drum it falls down on to incline copper plates, the same as is now used in stamp mills.

The amalgam can be collected from the drum and plates without stopping the machine, and any live quicksilver that passes will be caught in syphons. The tailings are carried off with the water. The machine when attached to the flume will be driven by the waste water; it sifts the fine sands from the coarse gravel, and amalgamates it as above.

The specific points claimed by Prof. Manes and Sons in their patent are—

1.—The saving of almost all the mineral passing through the machine.

2.—The loss being less than 10 per cent.

3.—The entire absence of loss of the amalgamated material, thereby saving all the mercury, which, with the processes now in use, there is a large loss both of mercury and the precious metal.

4.—The small cost per ton at which the ore can be treated.

By the addition of the powerful current of electricity that passes off the revolving brushes, the most minute particles of gold will be caught and retained, which in the ordinary flume and stamps passes off with the water; this often amounts to a large percentage.

The inventors state that if English stock companies will give their assistance to work the black sands of Oregon and California by paying for the building of the machines, they will take a share of the gold for their services, or they will send their machines to any part of the world, or will sell patent rights to those desiring any of their patent machines or revolving furnaces for roasting or smelting ores, ball pulverisers, &c.

Prof. James Manes and Sons are agents for the Morey and Sparey Ball Pulveriser, that crushes and pulverises at the same time, and does as much work as eight stamps in a day, crushing either wet or dry.

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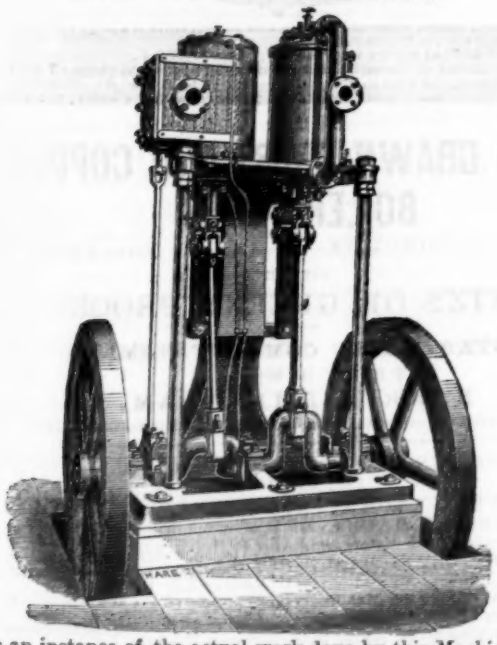

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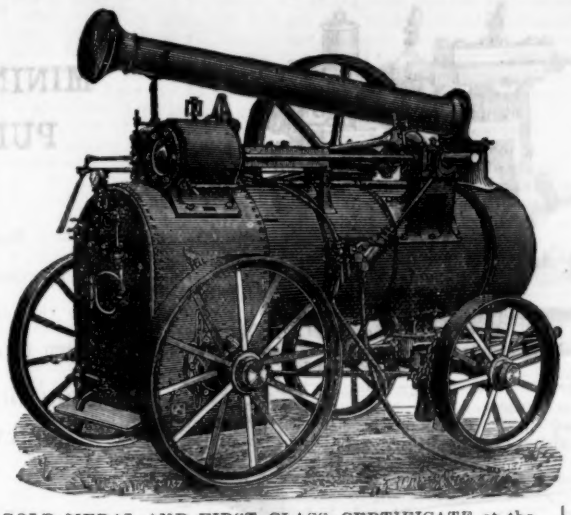

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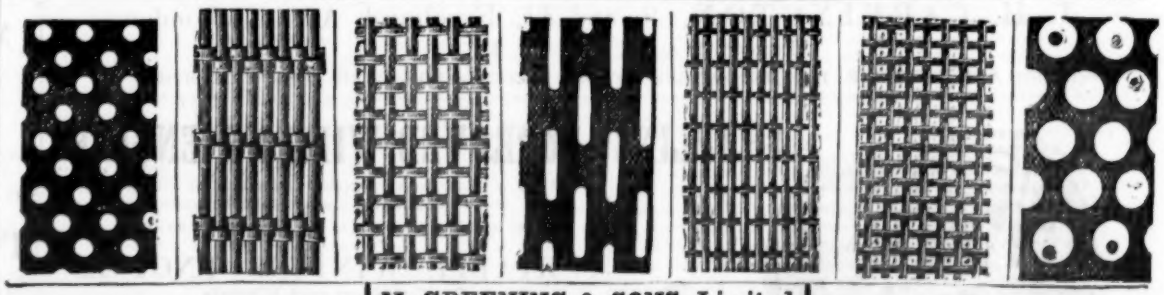

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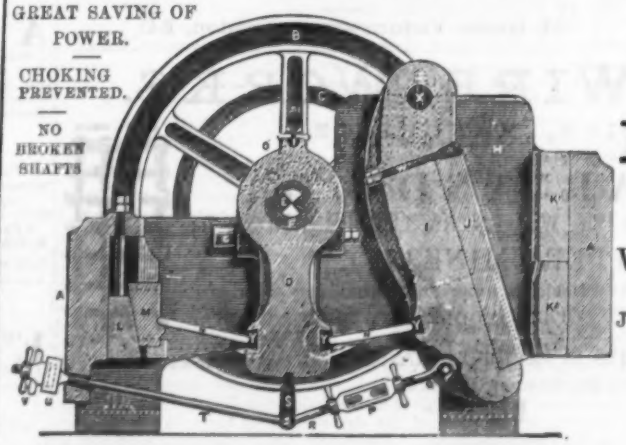

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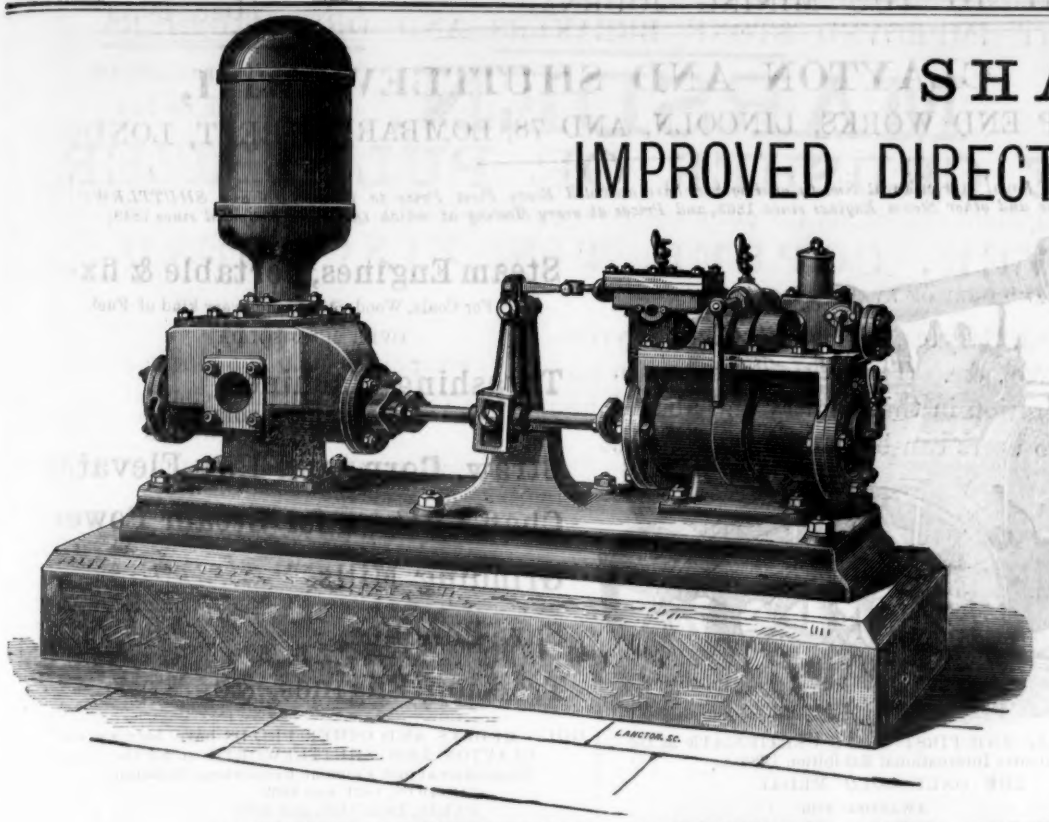

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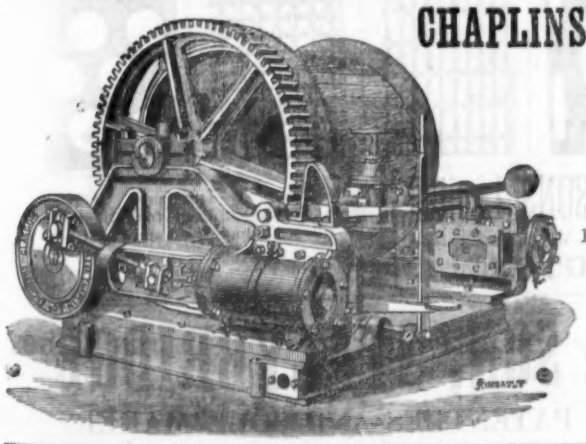

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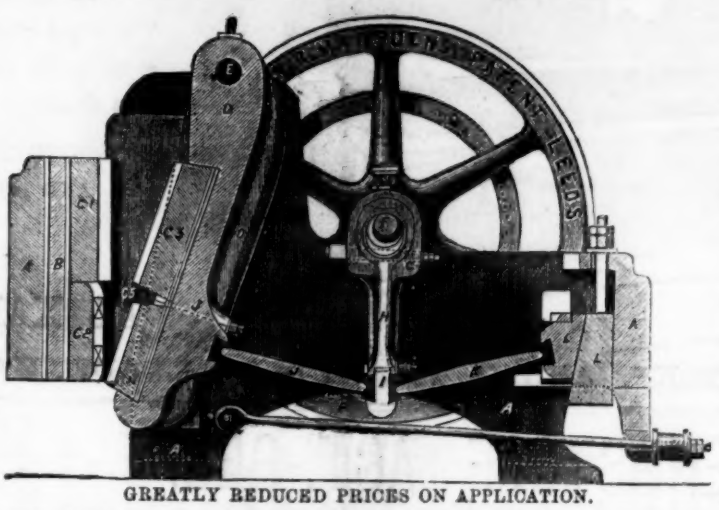

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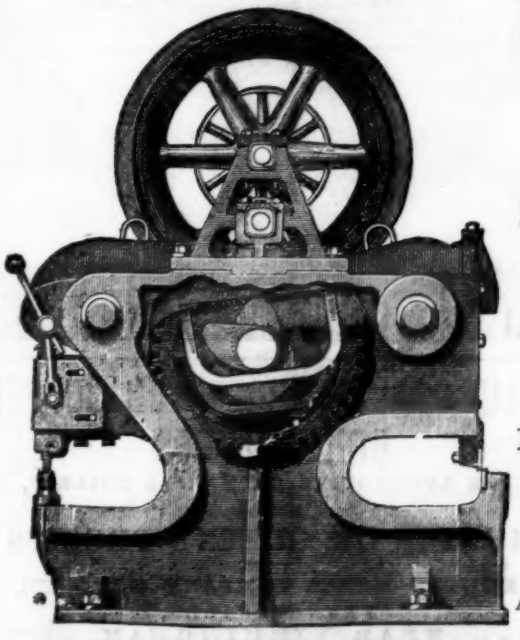

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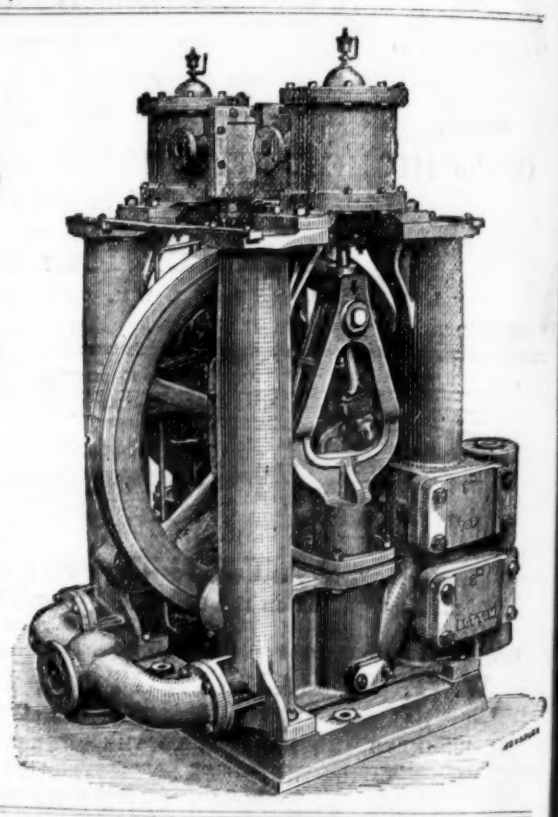

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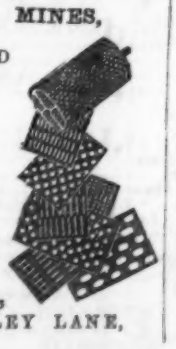

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